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ABSTRACT

The relationships among factors reported on report cards developed for local school districts in Tennessee were studied, offering information about how the selected factors relate to student outcomes. Each year Tennessee's State Board of Education produces a report card on each school district using data provided by the district and the State Department of Education. Data are presented in two report card sections: testing information (grade level, the prior school level, the present school year, and state average) and system information (professional educator information and student information organized under five headings: grade level, 2 years prior data, present year, and state average). Using 1988-89 data, eight categories of report card information were considered as follow: (1) county per capita income; (2) average professional salary; (3) expenditures per pupil; (4) average daily membership; (5) percent of students in attendance; (6) percent of oversized classes; (7) percent of students on free or reduced lunches; and (8) percent of professionals on Levels II and III of Tennessee's Career Ladder program. A state composite profile based on 139 districts was compared to report cards of 121 districts constituting the final sample. The relationships between these characteristics and student achievement outcomes were examined, and districts were compared. Analyses indicated that these eight variables do not explain student outcomes. Study results suggest that the report cards fail to reflect much of what accounts for student achievement. There are nine references and 12 tables. Four appendixes provide 26 figures that present supplemental information on linear regression, partial correlation, truncated linear analysis, and polynomial regression analyses. (SLD)

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WHAT POLICYMAKERS CAN LEARN FROM SCHOOL REPORT CARDS: ANALYSIS OF TENNESSEE'S REPORT CARDS ON SCHOOLS

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WHAT POLICYMAKERS CAN LEARN FROM SCHOOL REPORT CARDS: ANALYSIS OF TENNESSEE'S REPORT CARDS ON SCHOOLS.

I. INTRODUCTION

Currently, there is great interest in accountability based on student performance. "Report cards" on schools have become common in many states, and that concept is imbedded in the national education agenda (America 2000). However, little attention has been given to the value and uses of "report card" data.

In Tennessee (TN), a report card developed for each school district contains data on student academic achievement (test scores), educational expenditures, community per capita income, student enrollments and attendance, professional personnel and salaries, average class sizes and other factors deemed important to understanding education in the community and in providing comparisons with other schools or districts in the state and region. Generally, a reader does not know what relationship the entries have to each other or to student achievement, which is considered the "bottom line." The inclusions tend to imply that the factors reported strongly influence student achievement but that relationship is not directly stated or explored.

The purpose of this research was to study the relationships among factors reported on one set of report cards—those developed for local school districts within TN. The analysis offers information about how the selected factors relate to student outcomes. Results should interest policymakers and educators as they attempt to determine where and how to allocate resources (money, personnel, etc.), and as they consider report cards.

II. TENNESSEE'S (TN) REPORT CARD (1988-1989)

Each year, Tennessee's State Board of Education produces a report card on each school district using data provided by the district and by the State Department of Education. The cards report district-level data; i.e., individual school data are not reported. Tables 1 and 2 display the "Widget" city (TN) school district report card. Data are organized under two sections: (1) Testing information, and (2) System information. System Information includes professional educator information and student information.

Testing information for four sets of tests (in 1988-89) is organized under four headings: grade level, the prior school year (1987-88), the present school year (1988-89), and state average. System information is organized under five headings: grade level, two years prior data (1986-87) and(1987-88), present year (1988-89), and state average. Testing information is defined as follows (with abbreviations used in this paper):

a. **Basic Skills First Achievement Test (BSF)** *The BSF is a state-developed criterion-referenced test administered to students in grades 3, 6, and 8 to measure how well students have mastered reading and mathematics skills. Scores show the average percent of skills mastered by students in system.* This study used the 1989, 8th-grade data.
b. **Stanford Achievement Test (SAT)** The SAT was administered in grades 2, 5, 7 and reported in stanines. The SAT was discontinued (1989) and replaced by the STAS (Task 2). This study did not use the now discontinued SAT in the analyses.

Table 1 Testing information for Widget City Schools. Similar achievement data are found on the typical Tennessee School district's Report Card.

Testing Information for Widget City		Grade Level	1987-88	1988-89	State Average
Basic Skills First Achievement Test (percent score)	Reading	3	90	88	80
		6	82	80	77
		8	92	91	81
	Math	3	91	90	82
		6	67	71	66
		8	77	84	66
Stanford Achievement Test (Stanine score) 7-9 = High 4-6 = Average 1-3 = Low	Reading	2	6	7	6
		5	6	6	5
		7	6	6	5
	Math	2	7	8	6
		5	7	6	6
		7	7	7	5
	Spelling	2	6	7	6
	Language	5	6	6	5
		7	6	6	5
	Environment	2	7	7	6
	Science	5	6	7	6
		7	6	6	5
	Listening	2	7	7	5
		5	6	6	5
		7	6	6	5
	Social Science	5	6	6	5
		7	6	6	5
Stanford Test of Academic Skills (TASK 2) 7-9 = High 4-6 = Average 1-3 = Low	Reading	9	6	6	5
		12	6	6	5
	Math	9	6	6	5
		12	6	6	5
	English	9	7	6	5
		12	6	7	5
	Science	9	7	6	5
		12	6	6	5
	Social Science	9	5	6	5
		12	6	5	5
Tennessee Proficiency Test (% Students Passing)	Language	9	88	92	78
	Math	9	95	98	90
	Both	9	86	91	76

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Table 2. General information found on a typical school district's report card.

System Information for Widget City		Grade Level	1986-87	1987-88	1988-89	State Average
Number of Schools		K-12	5	5	5	12
Average Daily Membership		K-12	3,291	3,394	3,372	5,874
% Student Attendance		K-12	95.7	95.3	95.1	93.6
% Enrollment Change		9-12	-13.0	-16.1	-15.2	-24.7
% Oversized Class		K-12	1.2	1.4	2.3	3.8
% of Students on Free or Reduced Price Lunch		K-12	23	21	21	42
Expenditures per pupil		K-12	$2,718	$3,299	$3,501	$3,304
County Per Capita Income		K-12	"	"	$12,819	$12,878
% Elementary Schools Accredited by SACS		K-8		100.0	100.0	29.1
% Secondary Schools Accredited by SACS		7-12	100.0	100.0	100.0	64.9
Professional Educator Information						
% Professionals on Career Ladder Levels II & III		K-12	22.9	21.9	25.6	14.8
Average Professional Salary		K-12	$25,198.60	$26,085.44	$30,804.37	$26,756
Student Information						
% Diplomas Granted	Regular	12	90.6	68.7	75.8	81.8
	Honors	12	49.6	26.7	20.0	8.5
	Special Education	12	1.8	1.4	1.5	1.9
	Certificate of Attendance	12				0.9
	Seniors not Receiving Diploma in Spring Graduation	12	2.7	3.2	2.7	6.9
% Students in Vocational Education Courses		7-12	33.0	40.9	41.0	45.5
% Students in Special Education		K-12	12.1	11.3	12.1	14.2
% Chapter 1 Students		K-12	13.3	15.5	12.4	11.9

c. **Stanford Test of Academic Skills (TASK 2) (STAS)** *The STAS is administered t in grades 2, 5, 7, 9, and 12. These tests show how students perform when compared to students at the same grade nationwide. These scores are reported as stanines, scores from one to nine, where one is low and nine is high. An average score is four, five, or six. These scores show the average stanine on each part of the test for the students in the system.* This study used the 1989, 12th-grade data.

d. **Tennessee Proficiency Test (TPT)** *The TPT measures minimum skills in mathematics and language arts. Students must achieve a passing score of 70 percent correct on both the math and language arts tests in order to fulfill one of the requirements for receiving a regular diploma. Students take the test for the first time in the ninth grade.* This study used the 1989, 9th-grade data.

Seven of the eight categories of report card information used for this study are defined by report card developers (*Average Daily Membership* was not specifically defined): The definitions are:

a. **County per Capita Income (CCI)** *This figure represents the per capita personal income for the county in which your school system is located. The most recent figures available from the U.S. Bureau of Economic Analysis are for 1987.*
b. **Average Professional Salary (APS)** *This figure shows the* ***estimated*** *average salary for all certificated personnel in your school system.*
c. **Expenditures per Pupil (EPP)** *This figure shows the average number of dollars spent for each pupil in average daily attendance for your school system.*
d. **Average Daily Membership (ADM)** (*The Report Card did not provide a definition for this category*).
e. **Percent of Students in Attendance (%SA)** *This figure shows the average percent of students in attendance daily in the individual school districts for the school years 1986-87, 1987-88, 1988-89.*
f. **Percent of Oversized Classes (%OC)** *This figure shows the percent of classes in all grade levels which had waivers for being over the maximum class size. Maximum class sizes in Tennessee are: 25 for grades K-3, 28 for grade 4, 30 for grades 5-6, 35 for grades 7-12, and 23 for vocational (1989).*
g. **Percent of Students on Free or Reduced Lunches (%FRL)** *Students whose family income meets certain criteria are eligible for free or reduced price lunches. This figure shows the percent of students in your school system who receive free or reduced price lunches.*
h. **Percent Professionals on Career Ladder Levels II and III (%CL)** *This figure shows the percent of professional staff in your school system who have met the standards for Career Levels II and III. These are the upper rungs of Tennessee's Career Ladder program. The number includes regular classroom teachers, guidance counselors, librarians and administrators.*

The investigators chose the above eight categories (*including ADM*) and test results for detailed study. Many educators and lay persons belie*v*e that these factors influence student academic performance.

III. METHODOLOGY

Investigators used the 1988-89 report card data for the study. Although the report cards provided test results at several grade levels, only the average scores for the highest grade levels reported were used in these analyses. Those scores were considered as best representing the final product of the school system. Seven research questions guided the study:

1. How do school district characteristics currently reported in the report cards relate to reported student academic achievement?
2. How do reported school district characteristics relate to each other?
3. When rank ordered on the basis of student outcomes, how do school districts within the state perform in terms of the district and community characteristics reported in the report card?

4. Do the reported school district characteristics appear to represent all or most factors that influence student academic achievement?
5. When academic achievement is treated as scores on three separate test batteries, are patterns of influence changed?
6. Do "outlier" school districts significantly influence the findings of this study?
7. How might the findings of this study inform educational policy at state and local levels?

Investigators treated student outcome data (test data) as the dependent variable and other characteristics reported as independent variables that influence student outcomes. Several analyses were conducted.

First, a composite profile of all school districts in the state (n=139) was produced, as was a profile of the 121 school districts constituting the final sample. These profiles provided a statewide picture and helped researchers to determine if the study sample (n=121) varied in any significant way from the state composite.

To answer research question #1, three analyses were conducted. First, a linear regression assessed the relationship between each reported characteristic and the school district's mean student outcome. The researchers combined three sets of reported test scores to create a mean student outcome (MSO) measure for each school district. To create the MSO, the mean scores reported for each test were first converted to z-scores (see Nunnally, 1978, pp 24-34) that were used to compute the MSO (*As shown later, the MSO was a more useful variable than any single testing outcome*). Only school districts (n=121) reporting scores for all three tests (8th grade BSF; 12th grade STAS; and 9th grade TPT) were in the final sample. A Pearson Product Moment correlation was developed as a means of comparing categories.

The second analysis for question #1 used two procedures. First, report card information was reorganized into three clusters: testing, money, and school system information. That structure is outlined below:

1. Testing information (combined into the MSO)
   - Basic Skills First Achievement Test (BSF)
   - Stanford Test of Academic Skills (Task 2) (STAS)
   - Tennessee Proficiency Test (TPT)
2. Money Information
   - County per Capita Income (CCI)
   - Average Professional Salary (APS)
   - Expenditure Per Pupil (EPP)
3. School System Information
   - Average Daily Membership (ADM)
   - Percent of Students in Attendance (%SA)
   - Percent of Oversized Class (%OC)
   - Percent of Students on Free or Reduced Lunches (%FRL)
   - Percent of Professionals on Career Ladder Levels II and III (%CL)

The purpose of this clustering was to facilitate investigation of the interactions of multiple, related categories with student outcomes and with each other. Data for categories clustered as "Money" or "School System" were converted to z-scores, then the Pearson Product Moment correlation was applied.

The third analysis employed Guttman's partial correlation procedure. The partial correlations for each category were converted to percentages of influence, thereby enabling investigators to determine the relationship of each independent variable (category) to the dependent variable (MSO). The procedure was then repeated using three dependent variables [scores on the separate outcomes measures (*.e., BSF, STAS, and TPT*)].

To answer research question #2, investigators computed correlations among independent variables (categories in the Money and School System clusters). A *coefficient of determination* (r^2) showed the levels of interaction between categories within a cluster and across clusters.

Research question #3 required the rank ordering of districts within the sample by MSO. The investigators then considered the nine districts with the highest MSOs and the nine with the lowest MSOs.

Research question #4 required no further statistical analyses. The partial correlation coefficients and related percentages of influence previously developed provided the necessary data.

To respond to research question #5, the Guttman partial correlation procedure was applied to the relationship between each independent variable and each of the three test scores available for each school district.

Research question #6 allowed investigators to examine the effects of "outlier" districts on the statewide profile of relationships among variables. To respond to this question, the top 10% and bottom 10% of the school districts in each independent variable (student attendance, oversized classes, etc.) were eliminated from consideration, and a new Pearson Product Moment correlation coefficient for each independent variable and MSO was computed. Fisher's Zr-transformation was then used to evaluate the significance of the relationship between the two correlation coefficients (MSO and Truncated MSO). A second test was also applied to the existing data. A third order cubic polynomial was computed for each relationship; i.e., interaction between independent variable and MSO. Then Fisher's Zr-transformation was used to determine the significance between the original correlation coefficient and the new, polynomial coefficient.

Research question #7 was a means of focusing conclusions and implications. The development of report cards on schools and the demographic data reported in them reflect unstated assumptions about their relationship to a great extent. If the findings of this study have any value, it may well be the informing of policymakers and policy.

IV. FINDINGS

Findings of the study are reported in two areas: (A) descriptive analyses of school districts and (B) responses to the research questions.

A. Descriptive Analyses of School Districts

1. The 1988-89 Profile of TN's 139 School Districts

A profile of TN school districts (n=139) by Report Card category was developed (see Table 3). For each category, the report card (state) mean score, standard deviation (SD), number of schools submitting data and ranges of scores or numbers were compiled.

a. Outcome Data

Of the 139 TN school districts, 96% reported BSF scores, 89% reported TPT scores, and 87% reported STAS scores. An average of 81% of all students taking the 8th grade BSF in 1988-89 passed the Reading sub-test, and 66% passed the mathematics component. Just over 76% of all students completing the TPT

Table 3. A "Report Card" Profile of Tennessee's 139 School Districts in 1988-89.

139 SCHOOL DISTRICTS

	SD	n	Report Card Max	Min.	Mean
OUTCOMES					
Basic Skills First (BSF)			(Percent passing): 8th grade		
Reading	4.9	134	93	65	81
Math	7.6	134	85	43	66
Stanford (STAS); Task 2			(Stanine score): 12th grade		
Reading	.5	121	7	4	5
Math	.5	121	6	4	5
English	.6	121	7	4	5
Science	.5	121	6	3	5
Social Studies	.5	121	6	4	5
TN Proficiency Test (TPT)			(% Students passing): 9th grade		
Language	7.1	124	98	56	76
Math	6.4	124	100	59	90
Both	9.4	124	98	48	76
MONEY					
Co./Capita Income ($) (CCI)	2,030	139	19,318	6,934	12,878
Expenditure Per Pupil ($) EPP)	505	139	4,891	2,163	3,304
Aver. Prof. Salary ($) (APS)	2,683	139	34,796	21,015	26,756
SCHOOL SYSTEM					
Average Daily Mem. (#) (ADM)	11,702	139	104,788	188	5,874
Student Attendance (%SA)	1.3	139	97.1	90.3	93.6
Oversized Class (%OC)	4.6	122	21.5	0.1	3.8
Free/Reduced Lunch (%FRL)	4.3	139	86.0	9.0	42.5
Career Ladder II/III (%CL)	6.1	138	41.5	4.1	14.8

passed both the mathematics and language components. More students passed the TPT mathematics sub-test (90%) than the Language component (76%), a reversal of the results on the BSF, usually given a year earlier. In 1988-89, the mean scores of 12th grade students taking the STAS was near the 5th stanine (4.8-5.3) on all five sub-tests. Scores on all tests ranged from several SDs below to several above the mean.

b. Money Matters

In the **Student Expenditure Per Year** category, students in the richest school district were supported by $4,891 per year and the students in the poorest district by $2,163 per year, a $2,728 per year difference between the richest and poorest districts . The mean **County per Capita Income** was $12,878, with a range from $19,318 to $6,934 (*an approximate 300% difference*). The **Average Professional Salary** mean was $26,756, with a range from $34,796 to $21,015.

c. School System characteristics

All TN districts provided **Average Daily Membership** (ADM) data. The average school district's daily attendance was 5,874 students. The largest district had 104,778 students and the smallest had 188 students. The percent of **Student Attendance** (%SA) for the top school district in this category was two SDs above the mean and for the bottom school district, two SDs below the mean. The top district had 97% attendance and the lowest district had 90% attendance—a 7% difference. Percent of **oversized classes** (%OC) was reported by 122 school districts. State class size restrictions in 1988-89 were 25 students in grades K-3, 28 students in grade 4, 30 students in grades 5-6, 35 students in grades 7-12, and 23 students in vocational classes. An oversized class was any class exceeding these numbers. The percentage of oversized classes reported ranged from 0.1% to 21.5%.

Students participating in the **Free or Reduced Lunch** (%FRL) program in 1988-89 ranged from a low of 9% to a high of 86%. This category is one common (but usually understated) indicator of the socio-economic status (SES) level of families served by the school.

Tennessee has an operational career ladder program for professional educators (teachers, administrators, other). Since 1984,educators have been able to apply for evaluation for levels I, II, and III on the Career Ladder and receive merit pay as well as extended contract opportunities, if they achieve the upper rungs (Levels II, III). In 1988-89, approximately 15% of all educators had achieved **Career Levels II and III** (%CL). Percentages of educators at these levels in individual school districts ranged from 4% to 42%.

2. Descriptive Analysis of 121 TN School Districts Reporting Necessary Student Outcome Data

Student outcomes were a major focus of this study, so school districts that did not report all three sets of test scores were excluded from further investigation. Of 139 school districts, 121 provided all necessary student

test data. The profile for these 121 districts was like that of the total 139 districts (see Table 4). Mean County/district per capita income dropped 75 dollars. Average expenditure per pupil rose 19 dollars. Average professional salary fell 84 dollars. Average membership rose 689 students. Oversized classes dropped 0.4%. Students in the free or reduced lunch program rose 0.5%, and career levels II and III teachers dropped 0.2 %.

B. Findings Pertinent to Research Questions (*All correlations appear in the correlation matrix, Table 5*)

1. How do school district characteristics currently reported in the report cards relate to reported student achievement?

A linear regression model was used to assess the relationship between each reported characteristic and the school district's mean student outcome (MSO). In addition, by using the state mean and MSO, outlier school districts were identified. Below are the results of this analysis reported by characteristic.

Table 4. A Report Card Profile of 121 Tennessee School Districts sampled.

121 SCHOOL DISTRICTS

	SD	n	Max	Min.	Report Card Mean
OUTCOMES					
Basic Skills First (BSF)			(Percent passing): 8th grade		
Reading	4.9	121	91	65	81
Math	7.7	121	85	43	66
Stanford (STAS); Task 2			(Stanine score): 12th grade		
Reading	0.5	121	7	4	5
Math	0.5	121	6	4	5
English	0.6	121	7	4	5
Science	0.5	121	6	3	5
Social Studies	0.5	121	6	4	5
TN Proficiency Test			(% Students Passing): 9th grade		
Language	8.6	121	98	56	76
Math	6.4	121	98	59	90
Both	9.3	121	98	48	76
MONEY					
Co./Capita Income ($)(CCI)	1,962	121	19,318	6,934	12,878
Stud. Expenditure ($)(EPP)	509	121	4,891	2,318	3,304
Aver. Prof. Salary ($) (APS	2,693	121	34,797	21,286	26,756
SCHOOL SYSTEM					
Average Daily Mem.(#) (ADM)	12,395	121	104,788	375	5,87 4
Student Attendance (%SA)	1.3	121	97.1	90.3	93.6
Oversized Class (%OC)	4.1	110	21.5	0.1	3.8
Free/Reduced Lunch (%FRL)	14.5	121	86.0	9.0	42.0
Career Ladder II/III (%CL)	5.9	121	41.5	4.1	14.8

Table 5. Correlation Matrix for testing, money, and school system categories (Pearson).

		Outcome				Money			School System			
		BSF	STAS	TPT	MSO	CCI	APS	EPP	ADM	%SA	%OC	%FRL
Outcome	BSF	1										
	STAS	**.358**	1									
	TPT	**.387**	**.438**	1								
	MSO	**.753**	**.770**	**.793**	1							
Money	**CCI**	.140	**.368**	.219	**.313**	1						
	APS	.214	**.528**	**.272**	**.436**	**.706**	1					
	EPP	.081	**.354**	.087	.223	**.437**	**.783**	1				
School System	ADM	-.146	-.000	-.061	-.090	**.529**	**.410**	**.330**	1			
	%SA	**.403**	.117	**.418**	**.407**	.063	.042	-.138	-.155	1		
	%OC	**-.235**	**-.294**	-.174	**-.302**	**-.356**	**-.458**	**-.390**	-.198	-.203	1	
	%FRL	**-.347**	**-.422**	**-.362**	**-.488**	**-.533**	**-.372**	-.003	.063	**-.259**	.191	1
	%CL	.188	**.317**	.214	**.310**	**.338**	**.468**	**.266**	.025	.209	**-.348**	**-.321**

p .01 = **Bold**

a. Influence of County Per Capita Income (CCI)

Figure 1 (p. 11, and Appendix A, p. 29) shows a positive correlation between MSO and CCI. The regression line intercepts the MSO zero z-score mean at $11,000, a point $1,800 below the state average per capita income of $12,878. Generally, districts with greater CCI demonstrated higher MSO (r=.31). However, most (i.e., ≈9:1 ratio) school districts' per capita income falls below the reported state mean ($12,878).

Even while a positive relationship between CCI and MSO was demonstrated, there were "outlier" districts. Four districts had CCIs at least $2,000 below the state mean, but had MSOs at least one standard deviation above the mean. One of these districts had a per capita income almost $6,000 below that mean.

b. Influence of Average Professional Salary (APS)

The significant positive correlation between size of APS and MSO (r=.44) was the highest positive correlation for the three money categories. The mean APS in 1988-89 was $26,756, with a range from $21,000 to $35,000 (see Figure 2, p. 29). Most school districts (≈4:1 ratio) have a smaller APS than the state mean of $26,756.

Generally, school districts with higher APS demonstrated higher MSO's. However, this category also displayed "outlier" school districts. One of the nine districts with the highest MSOs in the state had an APS of

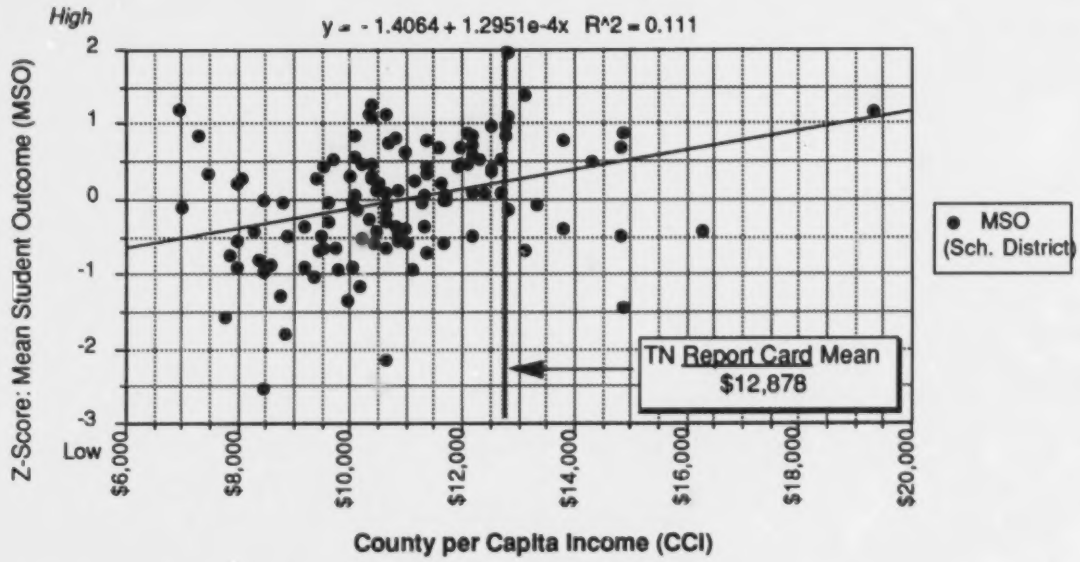

Figure 1. Relation of Per Capita Income to Mean Student Outcome. [1]

less than $22,000; another's APS was $24,000, and two others were under $25,000. Of the nine districts with the lowest MSO z-scores, all but one were below the APS state average.

c. Influence of Expenditure Per Pupil (EPP).

The majority of TN school districts did not expend the state mean EPP of $3,306 (≈4:1 ratio). The trend line in Figure 3 (p. 30) shows a small positive correlation between MSO and EPP. The EPP correlation (r=.22) with MSO was the smallest of the three money category correlations (see Table 5, p 10).

While districts with higher EPP tended to have slightly higher MSOs than other districts, six of ten districts with MSOs at or exceeding one SD above the mean were below the state mean in EPP. Two of those districts spent at least $500 less than the mean, and four spent at least $400 less. For every TN school district above the mean EPP, four were below the EPP mean.

d. Influence of Average Daily Memberships (ADM).

There was no significant correlation between school district size (ADM) and MSOs. The slight correlation was negative (r= -.09); larger district size tended to influence MSO negatively.

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1. All other figures (2 through 8) are formatted in the same fashion as Figure 1. They, together with Figure 1, are presented in Appendix A (pp. 29-32). Their inclusion in the text tends to clutter the discussion, and they are more meaningful when viewed as a group.

The state mean ADM of 5,874 students per district was influenced by a few large school districts, since most districts clustered below that mean (three districts below for every one above--see Figure 4, p. 30). In actuality, 83% of TN school districts reported fewer than 15,000 students. Only 10 districts had enrollments above 10,000 students, and two districts had very large enrollments (over 60,000).

e. Influence of Student Attendance (%SA)

A significant, positive correlation (r=.41) existed between %SA and MSO (see Table 5, p. 10). Generally, where average daily attendance was greater, achievement was higher.

State average student attendance in 1988-89 was 93.6% (Figure 5, p. 31). Most districts exceeded this average (ratio of ≈ 7 to 4). All districts where attendance averaged 92% or less demonstrated MSO z-scores at or below zero; 6 of 8 districts where average attendance exceeded 96% had positive MSO z-scores.

f. Influence of Oversized Class (%OC)

Of the 121 school districts studied, 110 reported oversized class data. There was a significant, negative correlation between %OC in a district and MSO (r=-.30) (see Table 5, p 10). Generally, districts with larger numbers of oversized classes had lower MSOs and vice versa. Low %OC is a high (good) (e.g., 1, 2) rank.

Among the 110 school districts reporting %OC, the average percentage of classes exceeding size regulations was 3.8 (see Figure 6, p. 31). Of the nine school districts with MSO z-score of negative one SD or below, seven exceeded the average percentage of oversized classes. Of the 9 school districts with an MSO z-score of plus one or above, only 3 exceeded the state average (3.8%). However, 37 districts that reported more than 3.8%OC demonstrated MSOs at or above the state mean. Fifteen districts reporting a %OC below 3.8% also had MSO z-scores below zero. The impact of class size cannot be simply interpreted.[2]

g. Influence of Free or Reduced Lunch as Socio-Economic Status Indicator (%FRL)

The percentage of free and reduced lunches (FRL) was one indicator of socio-economic status (SES) of the community; the higher %FRL , the lower the SES of the community. There was a significant negative correlation between %FRL and mean student outcome (r=-.49). School districts with lower percentages of free and reduced lunches generally had higher MSO z-scores. High FRL rank (e.g., 1 or 2) is few %FRL pupils.

The statewide average %FRL was 42%. However, two-thirds of all school districts reported percentages of %FRL below the state average (see Figure 7, p. 32). Seven of the nine districts with MSO z-scores of negative

2 This is an interesting finding considering the results of Tennessee's massive, four-year longitudinal/class-size study, Project STAR, which showed convincingly the benefits to student achievement of reduced class size (to 1:15) in primary grades (Finn & Achilles, 1990; Word, et. al., 1990). STAR, however, assessed grades K-3; this present analysis reviewed grades 9-12.

one SD or below had larger %FRL than the state average, and five of the six school districts with the highest %FRL demonstrated negative MSO z-scores. Alternatively, seven of the nine districts with MSO z-scores of plus one or higher had lower than state average %FRL. There were"outlier" districts. Two of the nine districts with MSO z-scores above plus one were above the state average for %FRL; one had 60% FRL.

h. Influence of Percentage of Career Ladder (%CL) Teachers

Since TN's Career Ladder program is intended to identify and to reward outstanding teachers, a high percentage of Career Ladder II & III teachers in a school district should indicate good instruction (*and high MSO*) in that district. Low percentages of Career Ladder II & III teachers did not necessarily suggest poor instruction, because the Career Ladder program is optional.

There was a significant but modest positive correlation between %CL teachers in a district and MSO (r=.31). The trend line in Figure 8 (p. 32) suggests that the greater the %CL teachers, the higher the MSO. The four school districts with the lowest MSO z-scores also had low %CL teachers.

The average percentage of upper-level Career Ladder teachers statewide was 14.8%, and slightly more districts reported percentages below that average than above (a ≈7:5 ratio). While seven of the ten districts generating the highest MSO z-scores reported greater %CL teachers than the state average, there were also "outlier" districts. The district with the highest %CL teachers had a MSO well below the state mean. Greater %CL of teachers was not a guarantee of better student performance. Keep in mind that Career Ladder status is not independent of years of teaching experience. To be eligible for Career Level II evaluation, teachers need eight years of experience; twelve for Career Level III.

I. Relationships of the Money and School System Clusters to Mean Student Outcome (MSO).

The three Money characteristics (*per capita income, per pupil expenditure, and average professional salary*) when combined, produced a significant positive correlation (r=.41) with MSO (see Figure 9, p.14). This finding is not surprising since each characteristic individually provided a positive correlation. Four school districts with money z-scores below zero produced MSOs at least one SD above the state mean, and one system with a money z-score one and one-half SDs above the mean produced a MSO one and one-half SD below the mean.

Data in Figure 10 (p.14) show that the five school system factors (*%SA, %FRL, %OC, %CL and ADM*), when combined, produced a moderately high, significant positive correlation (r=.50) with MSO. Based on the sizes of the correlation coefficients, these school system characteristics seem to influence MSO more than do the reported money factors. This finding suggests that other factors within a school district may be equally or more important than money.

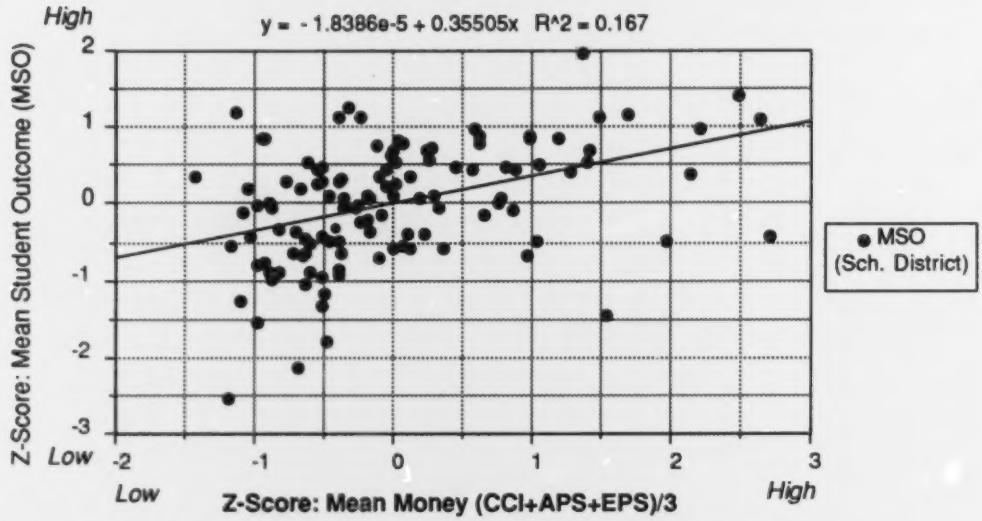

Figure 9. Relation of Combined Money Factors to Mean Student Outcome.

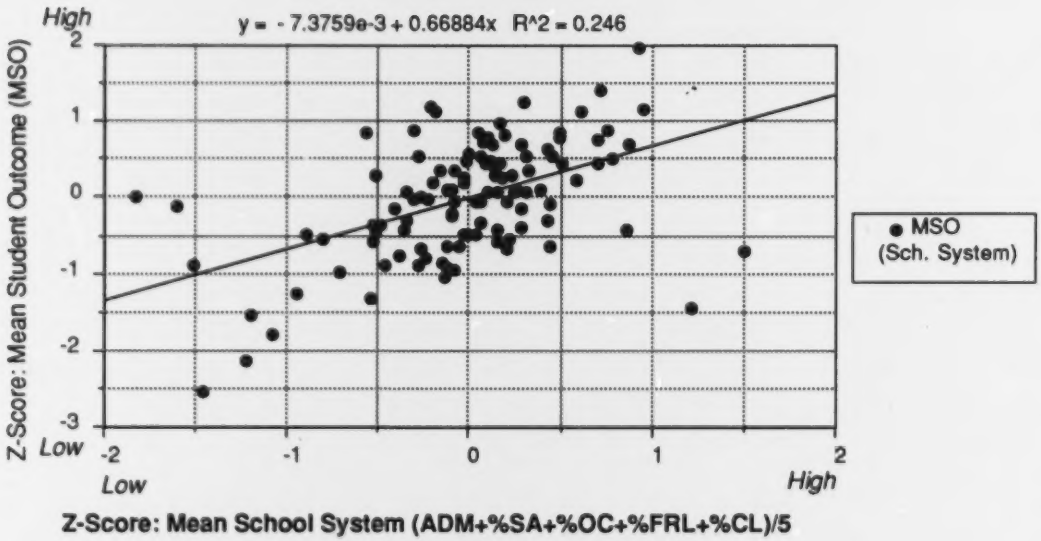

Figure 10. Relation of School System Factors to Mean Student Outcome.

Of the eight factors (see Table 5, p. 10) studied for their relationships to MSO, five demonstrated significant ($p \leq .01$) positive correlations, and two factors yielded significant negative correlations with MSO:

Positive

1. Average Professional Salary *or* APS (r=**.44**)
2. Percent Student Attendance *or* %SA (r=**.41**)
3. County Per Capita Income *or* CCI (r=**.31**)
4. Percentage of Career Ladder Teachers II & III *or* %CL (r=**.31**)
5. Expenditure Per Pupil or EPP (r=**.22**)

Negative

1. Number (percent) of Free or Reduced Lunches *or* %FRL (r= **-.49**)
2. Number (percent) of Oversized Classes *or* %OC (r= **-.30**)

Size of School District (Average Daily Membership or ADM) did not show a significant correlation with MSO.

j. Partial Correlation to try to Isolate Factor Influence.

These individual correlations do not fully answer research question #1. To refine the response, Guttman's partial correlation procedure was used; i.e., the ***Kaiser*** was run and a total matrix sampling adequacy greater than .500 resulted so that Guttman's assumptions were met. The matrix is in Table 6 (see p.16).

The partial correlation coefficients were converted to percentage of influence (PI) as displayed in Table 7 (see p.16). Several trends emerge from this analysis. First, the eight factors investigated account for only 26.5% of whatever relates to MSO, a fact discussed in more detail in response to research question #4.

Of the 26.5% influence on MSO exerted by the combined money and school system variables, almost 11% was provided by student attendance. A student's school learning and achievement are influenced by his/her presence in school. Six percent of the association with MSO was produced by %FRL; 5.6% was attributable to APS. The %OC accounted for only .6% of the MSO results; affluence of the community *(CCI)* contributed only .4% of the influence, and %CL contributed .2%. The EPP alone showed essentially **NO** association (.003) with MSO. Implications of these findings are discussed in response to research question #5.

2. How Do Reported School District Characteristics Interact with Each Other?

To determine the interaction of money and school system factors, they were correlated with each other. As demonstrated in Table 5 (p 10), significant ($p \leq .01$) correlations resulted for 17 of 28 combinations.

Significant positive correlations occurred between these nine factors:

a.	CCI and APS	r=.71	f.	APS and ADM	r=.41
b.	CCI and EPP	r=.44	g.	APS and %CL	r=.47
c.	CCI and ADM	r=.53	h.	EPP and ADM	r=.33
d.	CCI and %CL	r=.34	i.	EPP and %CL	r=.27
e.	APS and EPP	r=.78			

Table 6. Guttman's Partial Correlation matrix for MSO and the other Tennessee 1989 Report Card categories.

	Z: MSO	Z: CCI	Z: APS	Z: EPP	Z: ADM	Z: %SA	Z: %OC	Z: %FRL	Z: %CL
Z: MSO	***.444***								
Z: CCI	**-.061**	***.707***							
Z: APS	**.236**	.295	***.839***						
Z: EPP	**-.003**	-.007	.741	***.735***					
Z: ADM	**-.166**	.506	.211	-.151	***.493***				
Z: %SA	**.330**	.01	.005	-.188	-.057	***.266***			
Z: %OC	**.076**	.043	.033	.146	.071	.176	***.283***		
Z: %FRL.	**.244**	.499	.24	-.394	-.391	-.008	-.005	***.586***	
Z: %CL	**-.040**	.018	.299	-.127	-.166	.105	.163	.024	***.312***

Table 7. Partial correlations and percentage of influence (PI) of each category on mean student outcome.

	r	r^2	PI (%)
Money			
County per Capita Income (CCI)	-.061	.004	0.4
Average Professional Salary (APS)	.236	.056	5.6
Expenditure per Pupil (EPP)	-.003	.00	0.0
School System			
Average Daily Membership (ADM)	-.166	.028	2.8
Percent Student Attendance (%SA)	.330	.109	10.9
Percent Oversized Class (%OC)	.076	.006	0.6
Percent Free/Reduced Lunch (%FRL)	.244	.060	6.0
Percent Career Ladder II & III (%CL)	-.040	.002	0.2
TOTAL	—	---	**26.5%**

Significant negative correlations occurred between the following eight factors:

a.	CCI and %FRL	r= -.53	e.	CCI and %OC	r= -.36
b.	APS and %OC	r= -.46	f.	%OC and %CL	r= -.35
c.	EPP and %OC	r= -.39	g.	%FRL and %CL	r= -.32
d.	APS and %FRL	r= -.37	h.	ADM and %FRL	r= -.26

Most of these correlations are not surprising. Several relationships demonstrated in the negative correlations reflect "common sense." Per capita income and high % FRL are generally perceived to be related indicators of low socio-economic status of a community. Limited resources, higher numbers of free lunches, lower professional salaries, more oversized classes, and lower expenditures per student go hand in hand. Nor is it surprising that greater %CL teachers are found in communities with more money and lower class sizes.

Table 8. Profile of Z-scores of Nine Highest and Nine Lowest Ranked School Districts by MSO z-score, TN; 1988-89 data.

	OUTCOME	MONEY			SCHOOL SYSTEM				
	MSO	CCI	APS	EPP	ADM	%SA	%OC	%FRL	%CL
n	*121*	*121*	*121*	*121*	*121*	*121*	*110*	*121*	*121*
				Top 9					
RANK									
1	1.97	**1.00**	**2.18**	0.91	-0.26	0.92	0.87	**1.30**	**1.81**
2	1.40	**1.44**	**2.67**	**3.64**	-0.18	-0.20	**1.39**	0.53	**2.06**
3	1.26	-0.24	-0.10	-0.66	-0.42	**1.79**	0.59	0.46	-0.90
4	1.20	-2.00	-1.14	-0.29	-0.47	0.99	0.81	-1.39	-1.01
5	1.17	**4.31**	0.61	0.16	0.36	0.68	0.98	2.11	0.64
6	1.50	-0.28	-0.17	-0.27	-0.30	-0.04	-0.86	-0.16	0.38
7	1.14	-0.13	**1.69**	**2.87**	-0.31	**1.71**	**1.34**	0.46	-0.16
8	1.12	-0.24	-0.37	-0.55	-0.47	**1.79**	na	-0.22	**1.62**
9	1.11	**1.00**	**3.66**	**3.24**	-0.43	**1.31**	na	0.60	**2.36**
M		0.51	1.00	1.00	-0.27	0.99	0.73	0.41	0.75
				Bottom 9					
113	-1.04	-0.78	-0.71	-0.45	-0.32	-0.42	0.34	-0.09	-0.21
114	-1.17	-0.35	-0.60	-0.54	-0.19	1.47	na	**-2.08**	-0.35
115	-1.29	**-1.07**	**-1.31**	-0.93	-0.40	-0.36	**-2.65**	-0.02	**-1.33**
116	-1.33	-0.47	-0.98	-0.10	-0.14	**-1.00**	0.39	**-1.60**	-0.40
117	-1.43	2.04	1.34	1.22	7.92	-0.44	0.78	**-2.36**	0.16
118	-1.55	**-1.59**	**-1.31**	-0.05	-0.34	**-2.04**	**-1.44**	**-1.60**	-0.60
119	-1.77	**-1.03**	-0.55	0.15	0.02	**-2.92**	-0.05	**-1.53**	-0.94
120	-2.14	-0.13	**-1.36**	-0.61	-0.14	0.01	**-1.12**	**-3.18**	**-1.75**
121	-2.53	**-1.23**	**-1.20**	**-1.12**	-0.34	**-2.76**	**-2.65**	-0.16	**-1.39**
M		-0.51	-0.74	-0.27	0.67	-0.94	-0.80	-1.40	-0.76

Bold = MSO z-score and category z-score ***are*** similar *(i.e., both are either positive or negative and are greater than one)*.

Underline = MSO z-score and category z-scores are ***not*** similar *(i.e., if one is a ±1 or larger* **SD**, *the other item is a -1* or larger **SD**).

3. When rank ordered on the basis of student outcomes, do school districts within the state perform as expected in terms of the money and school system characteristics reported in the Report Cards?

One might expect that school districts with more money, better teacher salaries, enrollments which are not extreme (very large, very small), fewer oversize classes, higher attendance and high numbers of upper-level Career Ladder teachers would produce the best MSO. In general, those expectations were confirmed in the regression analyses conducted in response to research question one. There are, however, outlier districts producing MSOs significantly lower or higher than could be expected. Figures 9 and 10 (p. 14) show these exceptions. Tables 8 (p. 17) and 9 (p. 18) highlight these exceptions.

Table 9. Profile of ranks on eight variables of the nine highest and nine lowest ranked (Rk) school districts by MSO z-score, TN: 1988-89 data.

	MONEY			SCHOOL SYSTEM				
RANK	Rk CCI	Rk APS	Rk EPP	Rk ADM	Rk %SA	Rk %OC	Rk %FRL	Rk %CL
n=	*121*	*121*	*121*	*121*	*121*	*110*	*121*	*121*
				Top 9				
1	14	6	18	64	18.5	24	5.5	6
2	12	3	1	50	73	1	39	5
3	73	59	94	104	6.5	36	44.5	103
4	121	110	66	118	16.5	26	106	107
5	1	27	33	11	26.5	18	1	27
6	77	61	64	74	65	92	84	37
7	66	8	6	78	8	2	44.5	60
8	73	71	85	119	6.5	na	87.5	8
9	14	1	2	108	11.5	na	33	3
				Bottom 9				
113	99	90	78	80	84.5	44	79.5	62
114	80	82	84	51	9	na	116	74.5
115	105	120	111	101	80.5	107	74	114
116	88	105	48	44	106	43	112.5	78.5
117	3.5	13	13	1	84.5	27	118	48
118	117	119	42	84	117	101	112.5	88.5
119	103	80	34	23	121	64	109	104
120	63	121	90	45	60.5	97	120.5	119
121	108	115	116	87	120	108	84	116

Underlined = a 60 ranking difference between the district's MSO rank and the category rank.

In Table 8, the nine highest and nine lowest ranked districts by MSO are profiled by their z-scores on the eight independent variables. The district producing the fourth highest MSO does not conform to expectations in at least four of eight areas. It has low CCI and APS, a high %FRL and a small %CL. It does not rate as high as other districts in the "top nine" category in several other areas. It would not be expected to be a "top nine" MSO school district, but it is.

The school district ranked number 117, fifth from the bottom in MSO in the sample of 121 school districts is also an "outlier." It has the second highest CCI z-score (2.04) for the 121 school districts, high APS, and large EPP as demonstrated by rank and z-scores. It is, however, a large school district as demonstrated by its z-score in that category (7.92).

Table 9 (p.19) data are also useful in responding to research question #3. The nine highest performing school districts (MSO) and the nine lowest performing districts were profiled among all school districts studied based on their ranks on the eight independent variables.

The positional profile reveals that the third, fourth, sixth, and eighth highest performing school districts do not conform to commonly held beliefs about school district performance (e.g., a direct, positive correlation between MSO and school system data). District #3 places 73rd in CCI among 121 districts and 94th in EPP. It is a small (*104th ranking*), rural school district with relatively few Career Ladder teachers (*103rd ranking*). However, it has proportionately high %SA (*tied for 6th position*) among 121 districts.

School district #4 has the lowest per capita income among districts in the sample (*121st ranking*). It is 110th in APS and 66th in EPP. It is also a small, rural school district *(118th ranking)* with high %FRL (*106th position*) and low %CL teachers (*107th position*). However, it is tied for 16th place %SA and only 26th in %OC, indicating fewer oversized classes than roughly four-fifths of the districts studied. The eighth highest performing school district demonstrated a profile similar to district #4, except that its attendance was better (*tied for sixth*), and it had a higher %CL (*eighth position*).

The school district with the 6th highest MSO consistently ranked in the lower half of all districts on all factors except %CL teachers where it ranked at the bottom of the upper quartile.

The MSO factor in all of these districts is relative. These top nine are the best performing districts in the state, but the state averages typically do not place TN schools among the best performers in the country. It is clear, however, that money is not the most critical factor in MSO in TN's "high flyers." If any factors seem more closely associated with MSO more than any others, they are school district size (ADM) and oversized classes (%OC) as negatives and attendance (%SA) as positive. However, there are districts that do not have the highest %SA or lowest %OC that outperform the majority of districts in the state. Other factors, not present in these report cards but associated with student achievement, are operating. These findings interface with the finding that the eight factors studied account for only 26.5 percent of the mean student outcome.

The analysis of the nine worst-performing districts confirms the findings on the other end of the spectrum. Some profiles among this group do not conform to commonly held beliefs or even to the patterns of the "outlier" schools with top performance rankings. District #117 ranks among the top districts in the state in all three money factors, in the top quartile in oversized classes (*small number*), and in the top half in %CL. It has high %FRL (*118th position*) and is fifth from the last in MSO. The factors that might contribute to low performance are the large size of the school district (*1st ranking*), low student attendance (ranks in the bottom third of districts) and low SES (*118th in free/reduced lunches*). However, other districts with similar features (*except size*) did far better in student performance (*e.g., #4, except for %SA*).

The findings in response to research question #3 present a mixed message. Many districts did not perform as one could have expected based on the factors studied. They support the notion that the factors studied are not the primary determiners of student achievement.

4. **Do the reported school district characteristics appear to represent most factors which relate to student academic achievement?**

The answer to this question is clearly "no." The partial correlation and percentage of influence analyses reported in response to research question #2 (see Tables 6 and 7, p. 16) indicated that the eight factors studied as independent variables accounted for only one fourth of the influence on MSO. The ranking analysis for research question #3 also suggested that in both the highest and lowest performing school districts, factors other than those reported in the report cards were at work. Almost three-fourths of whatever accounts for student academic performance (as measured here by MSO) is unaccounted for based on these report cards--apparently in contradiction to "folk wisdom" about what determines student achievement.

5. **When academic achievement is treated as scores on three separate test batteries, are patterns of influence changed?**

Table 10 (p. 21) presents the results of Guttman's partial correlation procedure applied to the relationship between each independent variable and the three separate mean scores (Basic Skills First, Stanford Test of Academic Skills, Tennessee Proficiency Test) reported by each school district. A more detailed presentation of these data appear as Table 11, expanded in the Appendix B (p. 33).

The combined MSO has been used throughout the study because it seems the strongest measure of a school district's student achievement. All three mean test scores reported by a district are unique and separate measures. They are used for different decisions by Tennessee policymakers. In representing several tests and grade-level results, the MSO statistic seems to represent total student outcome best. However, investigators wished to see if influence patterns differed significantly when each available outcome measure was treated separately.

The combined eight factors used as independent variables account for only 18.6% of whatever influences scores on the BSF tests, 14% percent of the influence on the STAS scores, and 17.2% of TPT results. In other words, the influence of these eight "independent" variables varies by test, and no pattern of influence is greater than that reported for the combined MSO. Further, these variables influence scores on state developed tests to a greater extent than nationally developed tests.

When reviewing the relationships between the several independent variables and student outcomes, it is interesting to note that the variable exerting the greatest influence on student outcomes, attendance (%SA) does not influence scores on the STAS battery at all (0%), but does influence BSF (10%) and TPT (12%). Percentage of free or reduced lunches does not influence any single test score more than 4%, but that factor accounts for 6% of the influence on combined MSO. The %CL in a school district appears to influence only

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Table 10. Guttman's Partial Correlations Between Independent and Dependent variables

	CCI	APS	EPP	ADM	%SA	%OC	%FRL	%CL	Total % Influence
BSF	0.5	0.7	1.3	1.3	[10.0]	1.1	[3.4]	0.2	**18.6**
STAS	0.1	[7.0]	0.0	[2.9]	0.0	0.5	[3.6]	0.0	**14.0**
TPT	0.1	2.3	0.1	0.5	[12.2]	0.0	2.0	0.0	**17.2**
MSO	0.4	[5.6]	0.0	[2.8]	[10.9]	0.6	[6.0]	0.2	**26.5**

Box = Any percentage of influence rounded to, or larger than 3.0.

scores on the BSF, and that influence is almost negligible (0.2%). The greatest influence on Stanford scores among variables reported is APS (7%). Class size (%OC) influences only the BSF test scores at a level representing 1% or less of the influence exerted. Finally, APS, ADM, %SA, and %FRL appears to influence to some degree student outcomes, while CCI, EPP, %OC, and %CL have negligible influence on outcomes.

The data from this analysis confirm that combined influence of the eight factors reported is relatively small. There is much more that needs to be known about what contributes to student achievement. They also suggest that different tests may be influenced differently by the same factors, and that there may be need to consider the importance of differences in assessment measures produced at/for a state level and those produced at/for national use.

6. Do "outlier" school districts significantly influence the findings of this study?

As described in the Methodology section of this paper, two procedures were used to develop answers to question #6. First a truncated MSO correlation coefficient was established for the interaction of each independent variable with the MSO of the "middle" 97 school districts. The 97 school districts used in this computation were determined by eliminating the top 10% and bottom 10% of school districts on the ranking continuum for each independent variable. Here, the data were truncated to fulfill the Pearson Product Moment correlation assumptions of *bivariate normal distribution* and *homoscedasticity*. This alternative statistical analysis was used to compare the "r" with the Polynomial regression "r". A second step in both procedures was application of Fisher's Zr-transformation to determine the significance between the original correlation coefficients and the coefficients produced by the newly applied procedures.

The results of the truncated MSO procedure are presented in Table 11 and Figures 11 -18 (Appendix C,

Table 11. Differences between MSO and Trucated MSO correlations and eight Tennessee Report Card categories, 1989 Tennessee Report Card data.

AREA	MSO *n=121*		MSO Truncated *n=97*		Difference		
	r	z	r	z	r	z	t
CCI	.313	.321	.421	.448	.108	.127	.919
APS	.436	.466	.228	.229	.208	.237	1.714 **
EPP	.223	.224	.084	.084	.139	.140	1.013
ADM	-.090	.090	-.032	.032	.058	.058	.420
%SA	.407	.430	.210	.213	.197	.217	1.570 *
%OC	-.302	.310	-.126	.127	.176	.183	1.323 *
%FRL	-.488	.530	-.288	.293	.200	.203	1.468 *
%CL	.310	.321	.200	.203	.110	.118	.854

* p≤.10
** p≤.05

pp. 34-37). These findings are presented in the following paragraphs with brief explanations of their contents as compared to the findings reported for research question #2.

Table 11 depicts significant relationships between the correlation coefficients established for four variables: average professional salary, percentage of student attendance, percentage of oversize classes and percentage of students on free and reduced lunch. Only one of these interactions was significant at the .05 level: Average Professional Salary (APS).

The impact of the deletion of "outlier" school districts from consideration is shown in the figures presented in Appendix C (pp. 34-37). Trendlines generated in these figures can be compared with those displayed in Figures 1 through 8 on pages 29 through 32.

Figure 11 (p. 34) displays a positive correlation between CCI and MSO, when the truncated MSO procedure is applied. Comparison of Figure 11 with Figure 1 (p. 29) shows their similarity. The correlation and resulting trend line are simply not as pronounced (steep) when the counties with highest and lowest CCI are removed from consideration (r=.313 , 421, respectively).

Figure 12 (p. 34) displays a positive correlation between APS and MSO, as did Figure 2 (p. 29) in the initial analysis. The deletion of outlier districts decreases the slope of the trend line markedly. The difference (p≤.05) between the correlation coefficients (r=.436,.228, respectively) produced in the original analysis and the truncated MSO analysis (Table 11) suggests that salaries in the outlier school districts "drove" the degree of relationship found between these variables in our first analysis.

Figure 13 (p. 35) should be compared with Figure 3 (p. 30). Threre is a positive relationship between EPP and MSO. However, the truncated MSO analysis levels the trend line considerably. Outlier school districts spending much smaller or much greater amounts of money than the majority of districts influence the

relationship of variables reported in the first analysis.

Figure 14 (p. 35) depicts the relationship of ADM to MSO using the truncated MSO analysis. When comparing the trendline in Figure 14 to that in Figure 4 (p. 30), very small and/or very large districts in the state accounted for all the negative correlation found in the first analysis. Apparently, ADM influences student outcomes most negatively when a school district is very large. However, neither correlation was significant.

Figure 15 (p. 36), like its counterpart, Figure 5 (p. 32) displays the relationship between %SA and MSO. The significant ($p \leq .10$) relationship is positive in both analyses, but the outlier school districts had a profound effect on the slope of the trendlines. It is difficult to conclude exactly the relationship of %SA to student outcomes by studying these two figures.

The effects of %OC on MSO is re-examined in Figure 16 (p.36)(For comparison, see Figure 6, p. 31). While the truncated MSO analysis yields a slight negative relationship, the trendline in the initial analysis containing outlier school districts was much steeper. Comparison of the initial points on the lines demonstrates only small differences. A small %OC does not effect current student outcomes in a school district greatly. A large %OC does have substantial negative impact.

Results of the truncated MSO analysis of the impact of %FRL are displayed in Figure 17 (p. 37). The comparable figure in the original analysis is Figure 7 (p. 32). In both analyses, greater %FRL correlate negatively with MSO as reported in Table 12. Negative relationships were reduced significantly when outlier school districts were removed from the analysis.

Figures 18 (p. 37) and 8 (p. 32) portray the impact of %CL on MSO. In both "portraits", the relationships are positive; i.e., the greater the %CL, the higher the student outcomes.

Several findings resulting from the truncated MSO analysis of available data lead to the finding that the outlier school districts (top 10% and bottom 10%) as defined for each independent variable substantially impact the relationship between that variable and MSO, not in the direction of the relationship, but in its intensity.

C. Results of the Polynomial Regression Analysis

A second procedure was applied to available data to try to answer the question of outlier school districts' impact on the relationships between independent variables and the dependent variable MSO. Table 12 displays the results of computation of a 3rd order cubic polynomial for each relationship as compared with the Pearson Product Moment correlation coefficient developed in the first analysis. In only two categories, %OC and %CL, were differences in the two coefficients significant at the .10 level. However, Figures 19 through 26, Appendix D (pp.38-41), portray aspects of the various relationships which were not generated by the statistical treatments used in the first two analyses.

The polynomial analysis of the relationship between CCI and MSO displayed in Figure 19 (p. 38) clarifies

the positive correlation between the variables. Differences between CCI of $5,000 and $7,000 appear to have little effect on student outcomes. Increases in CCI between $7,000 and $17,000 influence student achievement positively.

Figure 20 (p.38) shows multiple aspects between APS and MSO. Increases in APS between $20,000 and $26,000 generally contribute to positive increases in student achievement. Increases between $26,000 and $31,000 appear to have relatively little additional impact on student achievement, but when average salaries move beyond $32,000, the positive relationship rises dramatically. The APS probably reflects the experience of professional staff as well as compensation. The figure may indicate that an experienced professional staff generates higher student achievement than does an inexperienced one.

The 3rd order polynomial analysis of the relationship between EPP and MSO (Figure 21, p. 39) produces a trend line closely resembling a straight line relationship. Increases in EPP positively correlate with MSO at all points along the line; however, the impact of increases in these expenditures is more noticeable between $2,000 and $3,000 and between $4,000 and $5,000 than between $3,000 and $4,000.

Figure 22 (p.39) presents the polynomial analysis of the relationship between ADM and MSO. There is a slight positive interaction of these variables with increases in size up to 40,000 students. This positive correlation may reflect the ability of a somewhat larger school district to provide curriculum breadth and more instructional resources. Increases in size between 40,000 and 60,000 students do not seem to change the relationship. In the one school district beyond 60,000 students, student achievement decreased.

Figure 23 (p. 40) shows the relationship between %SA and MSO, using the 3rd order cubic polynomial

Table 12. Fisher's Zr-transformation was used to compare the Pearson Product Moment "r" with the 3d order "Cubic" polynomial regression "r".

AREA	MSO n=121		MSO 3rd order "Cubic "Polynomial n=121		Difference		
	r	z	r	z	r	z	t
CCI	.313	.321	.344	.354	.031	.033	.320
APS	.436	.466	.508	.556	.072	.090	.873
EPP	.223	.224	.290	.299	.058	.075	.727
ADM	-.090	.090	-.192	.192	.102	.102	.990
%SA	.407	.430	.330	.343	.109	.087	.843
%OC	-.302	.310	-.446	.478	.199	.168	1.629 *
%FRL	-.488	.530	-.500	.549	.012	.019	.184
%CL	.310	.321	.434	.464	.124	.143	1.386 *

* p≤.10

analysis. Increasing attendance correlates positively with student achievement, until attendance reaches about 96%. Increase from 96% to 97% does not appear to change the relationship. Beyond that point there is a slight downturn in the relationship. Further, 99% or 100% attendance would mean that the least able learners in the district were in school most of the time. This phenomenon might result in lower district wide test scores.

Figure 24 (p. 40) shows a complex relationship between %OC and MSO. As the percentage of oversized classes increases from 0% to 18%, student achievement decreases.

Figure 25 (p.41) presents the polynomial analysis of the impact on MSO of %FRL. When fewer than eight percent of the student body received this aid, achievement was not affected. As the percentage rises from 8 to ~85, achievement shows a significant downward trend. At that point the trend line "bottoms out," and achievement actually begins a slight upward trend when 85% or more of the students in a school district receive this service.

The cubic polynomial analysis of the relationship between %CL teachers in a school district and MSO is depicted in Figure 26 (p. 41). An increasing correlation is clearly seen between the two factors as %CL rises from .0 to 25%. Between 25 and 50 percent, there is a dramatic downturn of the trend line due to the influence of one "outlier" school system. Without this one district, the projected trendline would be level.

V. CONCLUSIONS AND IMPLICATIONS OF THE STUDY

Investigators developed a fifth research question as a means of trying to frame conclusions and implications in a useful way:

7. How might the findings of this study inform educational policy and policymakers at the state and local levels?

a. Imputs Aren't Enough. Several points seem clear. "Good" inputs to the educational process (*money, small classes, good community*, etc.) do not guarantee high student achievement. If we must study student achievement, we might study outputs (outcomes) not inputs and, following "effective school" methods, try to determine "correlates". Inputs commonly assumed to be associated with outputs account for only minor variation in performance outcomes (just over one-fourth). The individual association of most of these factors (with the exception of attendance) is minor; debate over and attention to any one in isolation may be a wasteful activity. If we want to impact student performance, a comprehensive approach is needed.

In recent years, there have been attempts to compromise comprehensive educational reform packages by putting major emphasis and resources into one or two strongly lobbied dimensions of the comprehensive plan. While this approach may soothe feelings, it will do little to improve student achievement.

b. **These Eight Inputs Don't Explain Outcomes.** Another conclusion of the study: the TN Report Card does not deal with and report many important influences on student outcomes. What are they?

On the other hand, we may know more than we're measuring and reporting. It is currently popular to talk about restructuring schools, teaching and learning conditions and parent-school relationships. Some educators suggest and have some research ("soft data") that student motivation and self-concept, student and educator attitudes, school climate, teaching strategies, administrator and teacher styles and parent involvement in schools must change before much change will be seen in student academic achievement. Those factors can be rather easily measured and reported. Note the RJR Nabisco Foundation's Next Century Schools Project, the Coalition of Essential schools and other such endeavors. How much influence do some of these other factors have on MSO?

A major danger is that teachers and administrators may focus upon the "factors" reported on Report Cards to make their schools look good. Meanwhile, the important elements are overlooked.

c. **Assessments Used May Be a Factor.** Assessing what students know and are able to do is a problem. The investigators used available, reported test results in these analyses; the findings are only as good as the test results. There is debate about the value of present tests—both their content and format (see Kappan, Nov. 1991). If the tests used to form the dependent variable in this study (MSO) were not measuring the right things or were not measuring them validly and reliably, all other findings reek. The investigators do not challenge any of the tests currently in use in Tennessee. One statistical eccentricity noted was that correlations between the factors studied and MSO were usually stronger when the single outcome measure of achievement was a national test: The Stanford Achievement Test, Task II, rather than a state-specific test —the Basic Skills or Proficiency test (*BSF or TPT*).

Further, we can't ignore the relationship between teaching and testing. We have no information about the instruction and curriculum in these school districts. One would like to know those factors that correlate with the test results.

The use of the three analysis procedures in response to research question #6 also yields important conclusions and implications. Data from "outlier" school districts influenced the state profile greatly. The same situation probably exists when profiles are created at a district level. "Outlier" schools within the district will influence the district profile. For both accountability and for school improvement purposes, building-level data are probably the most useful and the most valid data available.

There appear to be few, if any, "straight line" relationships between inputs and outcomes. Relationships between money expended and student achievement, between student attendance and student achievement or any other combination of variables are complex. They must be studied carefully. The "outlier" schools also

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offer additional food for thought. The data in this study suggest that individual schools and school districts have overcome the presence of negative community and resource factors. We must determine how they have been able to do that, so that their experiences can be replicated. We should challege the proposition that student outcomes are pre-determined by existing conditions.

Analysis of Appendix B shows that criterion-referenced test results (BSF, TPT) are influenced by %SA, but that the norm-referenced test results (STAS) are not influenced by %SA. Additionally, the STAS is influenced by %APS (higher teacher salaries), while the criterion-referenced test results are not. This condition leads to some interesting speculation.

These results should be considered tentative. This a study of relationships; we make no claim for "generalizability," but we encourage people to consider similarities in these data and in report card construction and use in their own situations. The release of "The Report Card" may generate considerable attention--in smaller news markets results may warrant front-page notice. Perhaps state education officials use report card results as a basis for deciding that a district is at risk, or even needs external help. What is included in the report card influences perception and policy. Some inclusions obviously can be misleading.

In spite of their tentative nature, these findings are instructive. At least based on the results for this study, the media hyperbole and hoopla surrounding report cards are vastly over-rated as current report cards deal with an underwhelming part of schooling. If you wanted to know all about something (*100%*) and some strategy provided you 25% of the information, would you continue to emphasize that 25%, or would you want to find the missing 75%? Would you base reform and restructuring of education on what is known (25%) or would you seek to break the mold with new ideas?

Finally, there is a note for those who are contemplating, creating or modifying report cards on schools. If the entries on those report cards are similar to those investigated in this study, they provide interesting statistics but only a small amount of information which can be of use in improving education. Information entered into the report card is of minimal use until additional analyses such as those conducted in this study are performed to seek out what data may be (or may not be) saying.

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VIII. NOTES

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APPENDIX A
Linear Regressions (n=121)

Figures 1 through 8: Relation of Independent variables to student outcome (MSO)

When reviewing the following figures, the reader should be aware of two aspects of each visual image. The black dots represent data from each school district included in the study. A visual survey of the figure will establish where and how the school districts cluster in the analysis. The direction of the trend line gives the reviewer an immediate indication of the nature of the correlation. Lines moving upward from left to fight suggest positive correlations. "Flat" lines indicate little or no correlation, and lines moving downward from left to right indicate negative correlations. The degree of the slop of the line gives good indication of the significance of the correlation, even without the statistics themselves.

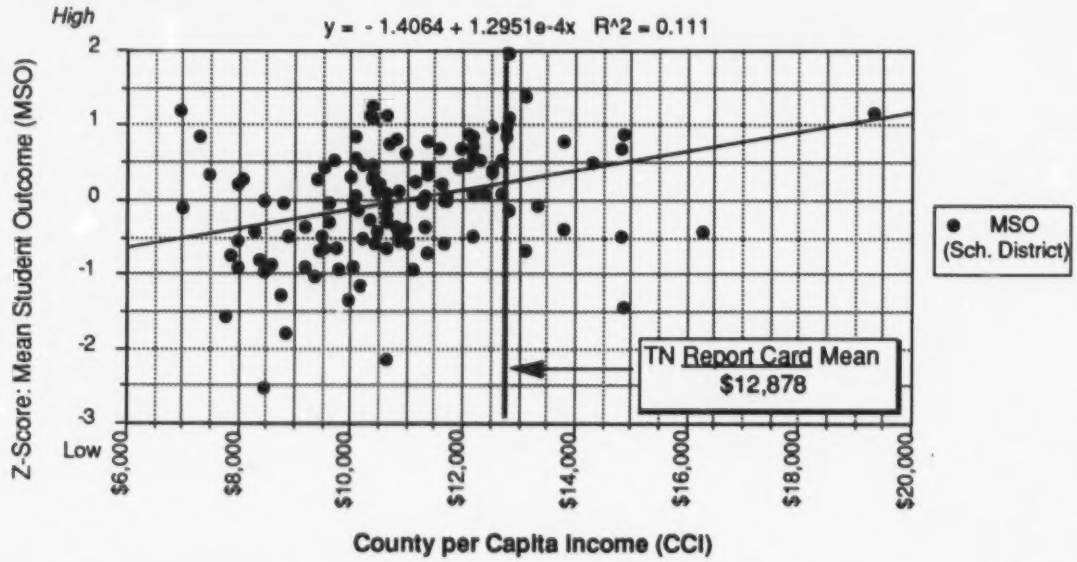

Figure 1. Relation of Per Capita Income to Mean Student Outcome (MSO).

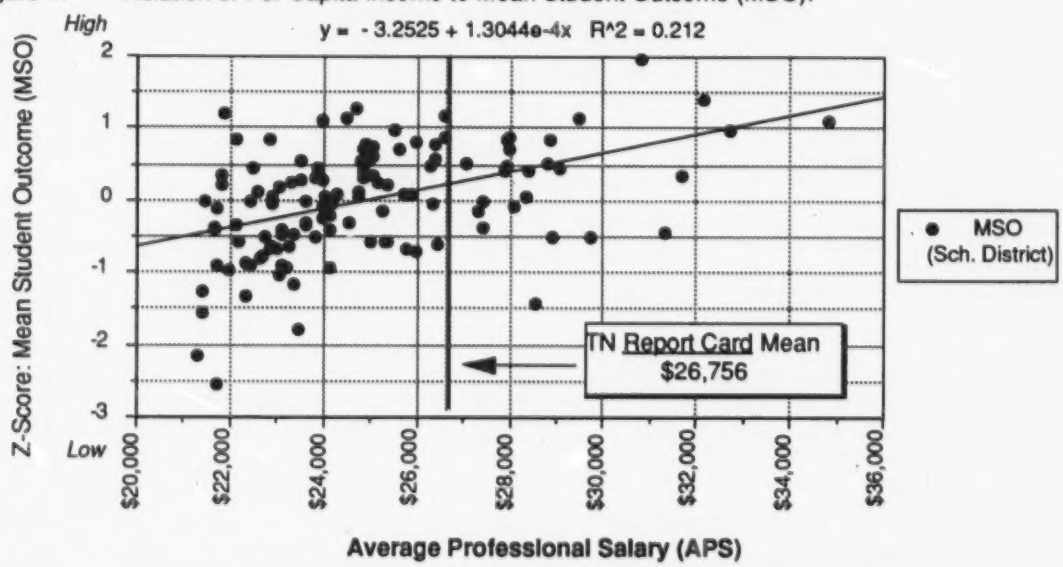

Figure 2. Relation of Average Professional Salary to Mean Student Outcome (MSO).

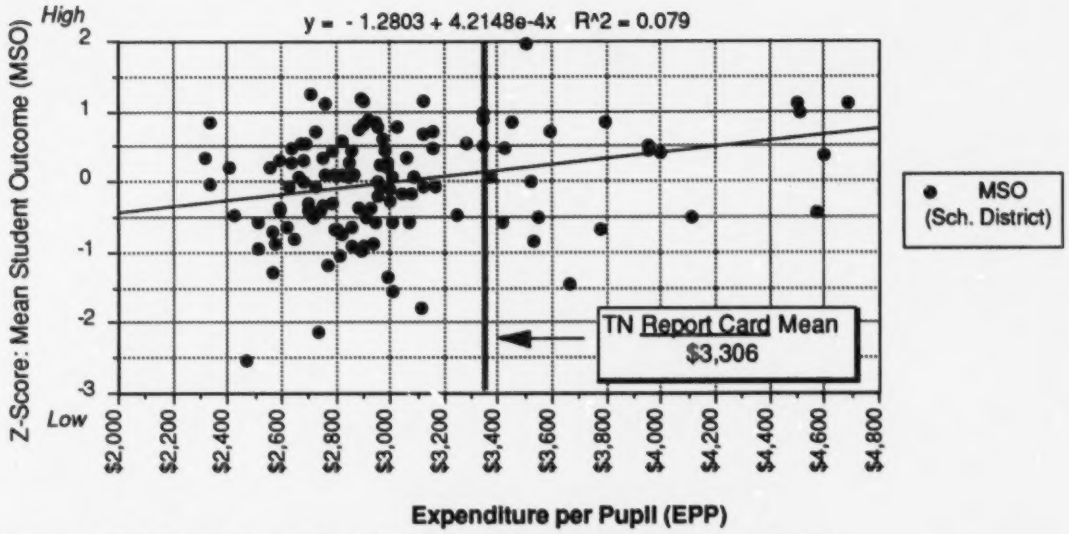

Figure 3. Relation of Expenditure Per Pupil to Mean Student Outcome (MSO).

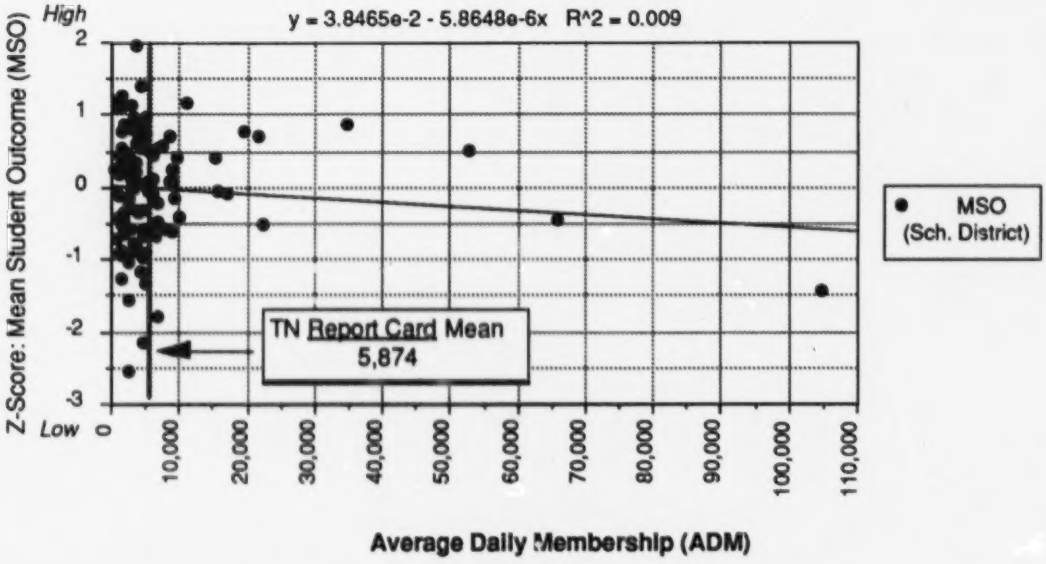

Figure 4. Relation of Size of School District (Average Daily Membership) to Mean Student Outcome (MSO).

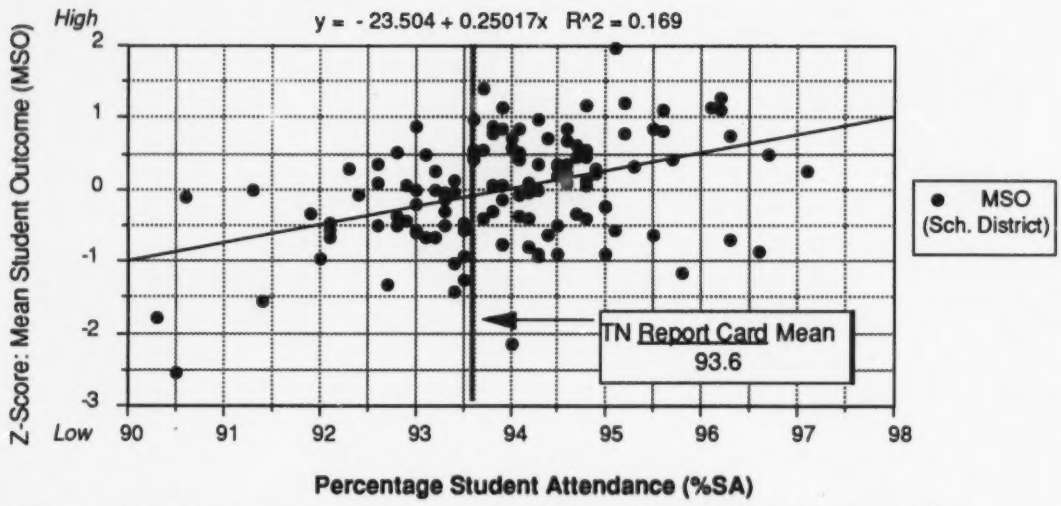

Figure 5. Relation of Percentage of Student Attendance to Mean Student Outcome (MSO).

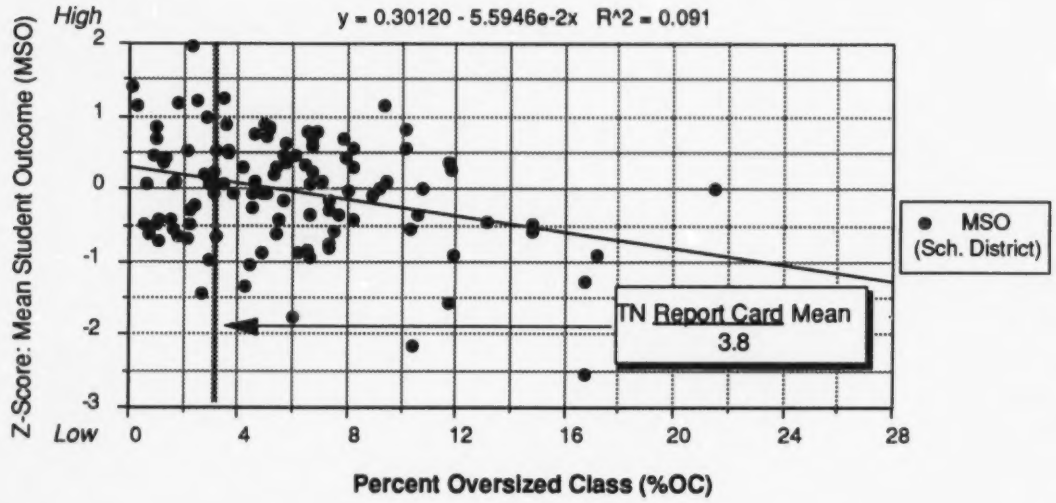

Figure 6. Relation of Percent Oversized Class to Mean Student Outcome (MSO).

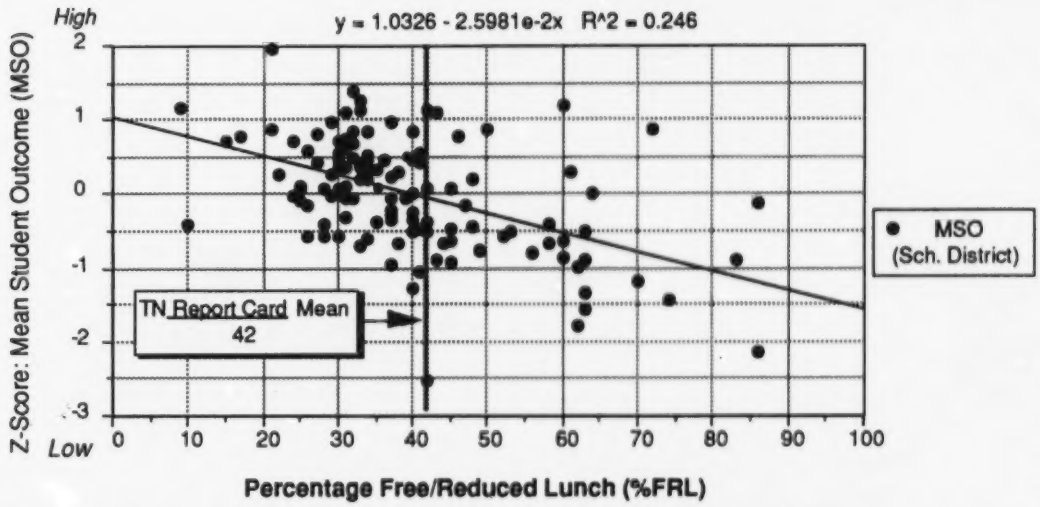

Figure 7. Relation of Percentage Free or Reduced Lunch to Mean Student Outcome.

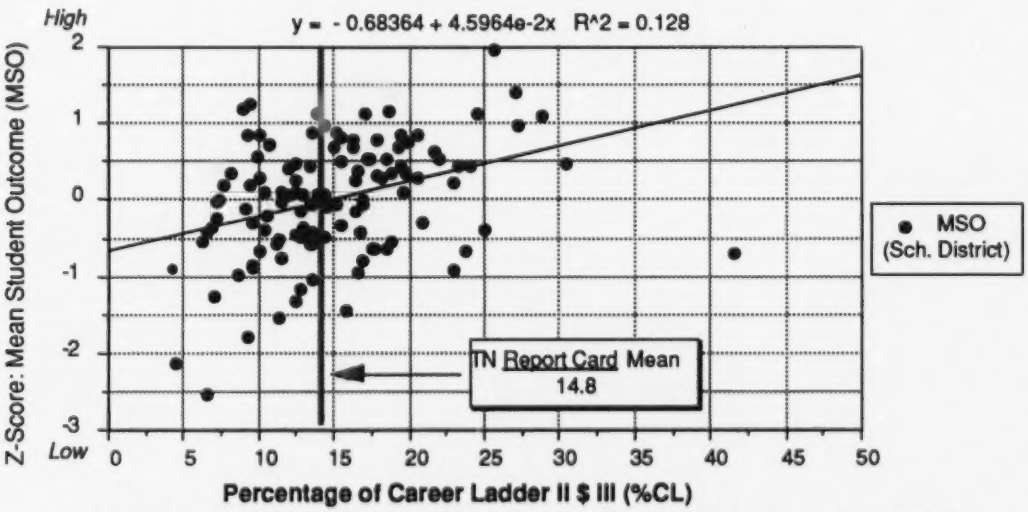

Figure 8. Relation of Percentage of Career Ladder Teachers to Mean Student Outcome (MSO).

APPENDIX B
Guttman's Partial Correlations

Basic Skills First (BSF)

	BSF	CCI	APS	EPP	ADM	%SA	%OC	FRL	%CL	Percent of Influence
BSF	0.27									
CCI	-0.07	0.71								0.5%
APS	0.09	0.29	0.83							0.7%
EPP	0.03	-0.01	0.76	0.74						1.3%
ADM	-0.11	0.51	0.19	-0.15	0.49					1.3%
%SA	0.32	0.01	0.06	-0.20	-0.08	0.26				10.0%
%OC	-0.11	-0.05	-0.04	-0.14	-0.07	-0.17	0.29			1.1%
%FRL	-0.19	-0.50	-0.29	0.40	0.42	-0.02	-0.01	0.58		3.4%
%CL	-0.05	0.02	0.30	-0.13	-0.17	0.11	-0.16	-0.02	0.31	0.2%
Total										**18.6%**

Stanford Test of Academic Skills: Task 2 (STAS)

STAS	0.38									
CCI	-0.03	0.71								0.1%
APS	0.26	0.29	0.84							7.0%
EPP	0.00	-0.01	0.73	0.74						0.0%
ADM	-0.17	0.51	0.22	-0.15	0.49					2.9%
%SA	0.00	-0.01	0.09	-0.20	-0.12	0.18				0.0%
%OC	-0.07	-0.04	-0.03	-0.15	-0.07	-0.21	0.28			0.5%
%FRL	-0.19	-0.50	-0.25	0.40	0.40	-0.08	0.00	0.58		3.6%
%CL	0.00	0.02	0.29	-0.13	-0.16	0.10	-0.16	-0.02	0.31	0.0%
Total										**14.0%**

Tennessee Proficiency Test (TPT)

TPT	0.28									
CCI	-0.03	0.71								0.1%
APS	0.15	0.29	0.83							2.3%
Z:EPP	-0.03	-0.01	0.76	0.74						0.1%
ADM	-0.07	0.52	0.19	-0.16	0.48					0.5%
%SA	0.35	0.00	0.03	-0.18	-0.09	0.28				12.2%
%OC	0.01	-0.04	-0.05	-0.15	-0.06	-0.21	0.28			0.0%
FRL	-0.14	-0.50	-0.29	0.40	0.44	-0.02	0.02	0.57		2.0%
%CL	-0.03	0.02	0.30	-0.13	-0.16	0.10	-0.16	-0.02	0.31	0.0%
Total										**17.2%**

Mean Student Outcome (MSO)

MSO	0.44									
CCI	-0.06	0.71								0.4%
APS	0.24	0.30	0.84							5.6%
EPP	0.00	-0.01	0.74	0.74						0.0%
ADM	-0.17	0.51	0.21	-0.15	0.49					2.8%
%SA	0.33	0.01	0.01	-0.19	-0.06	0.27				10.9%
%OC	-0.08	-0.04	-0.03	-0.15	-0.07	-0.18	0.28			0.6%
%FRL	-0.24	-0.50	-0.24	0.39	0.39	0.01	-0.01	0.59		6.0%
%CL	-0.04	0.02	0.30	-0.13	-0.17	0.11	-0.16	-0.02	0.31	0.2%
Total										**26.5%**

APPENDIX C
Truncated Linear Analysis (n=97)

Figures 11 through 18: Relation of Independent variables to Mean Student Outcome (MSO).

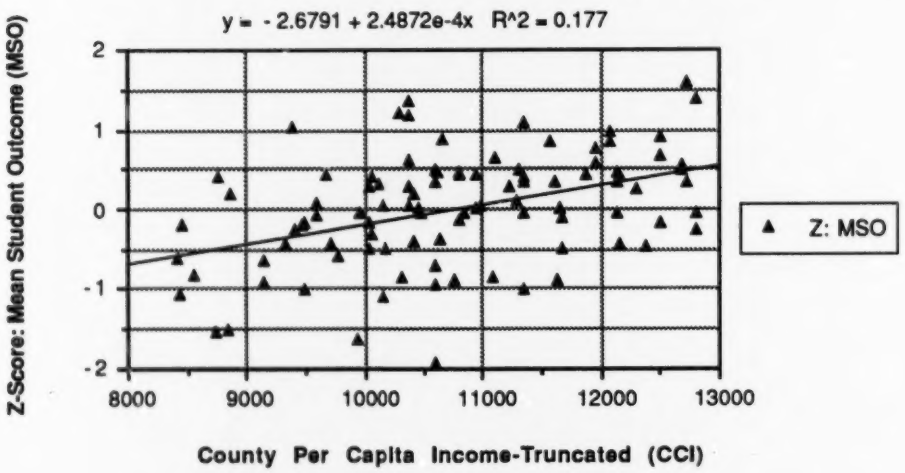

Figure 11. Relationship of Truncated County Per Capita Income (CCI) to Mean Student Outcome (MSO).

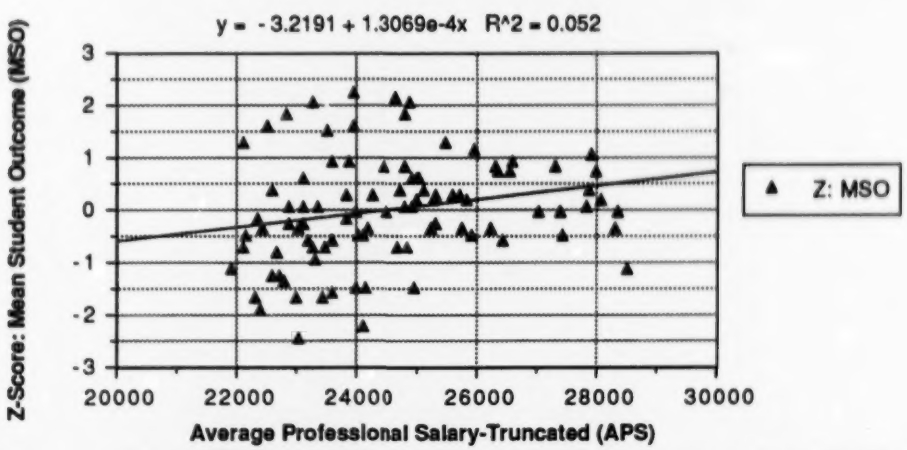

Figure 12. Relationship of Truncated Average Professional Salary (TAPS) to Mean Student Outcome (MSO).

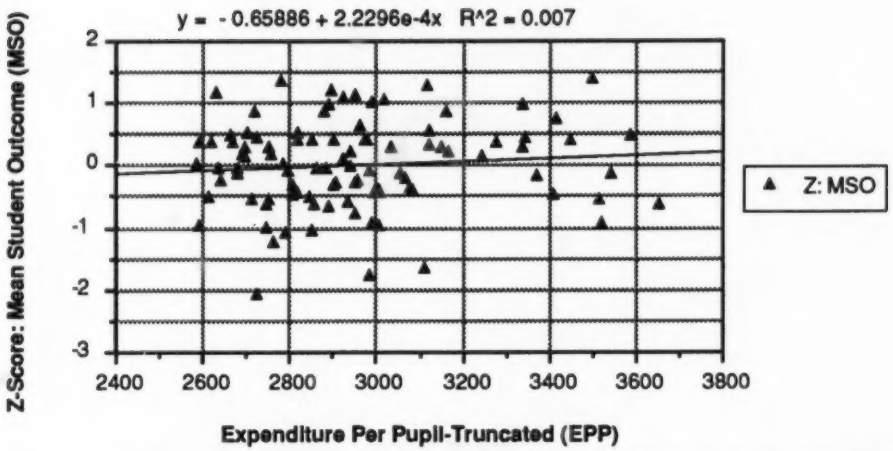

Figure 13. Relationship of Truncated Expenditure Per Pupil (EPP) to Mean Student Outcome (MSO).

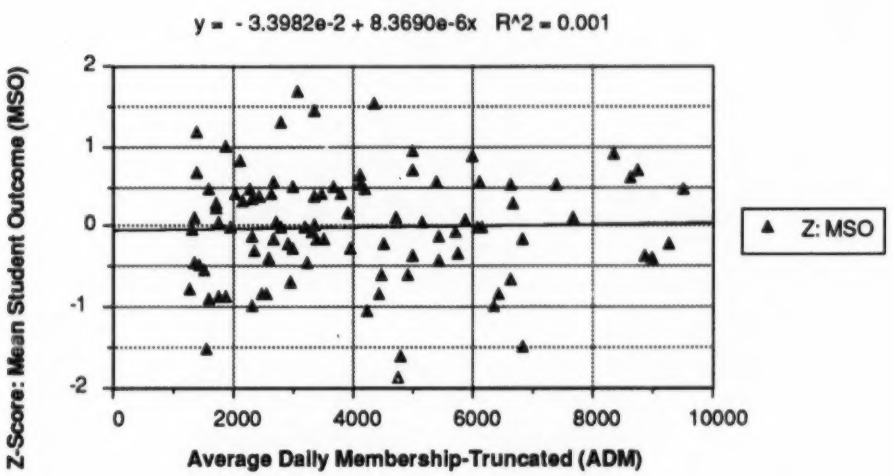

Figure 14. Relationship of Truncated Average Daily Membership (ADM) to Mean Student Outcome (MSO).

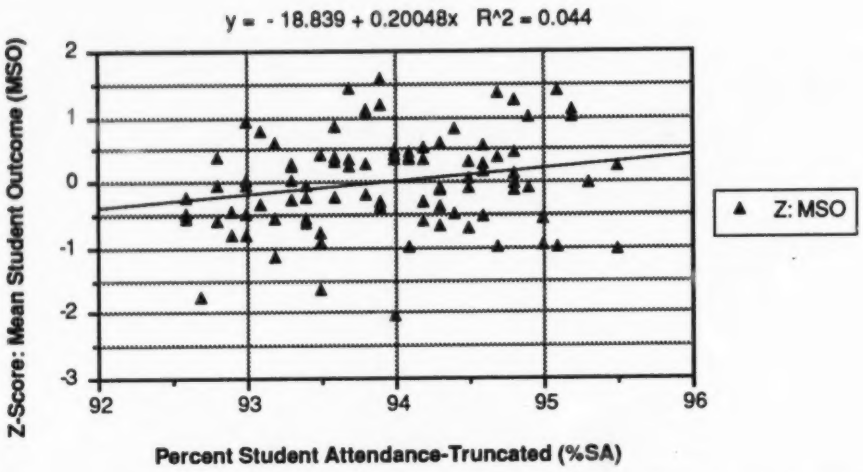

Figure 15. Relationship of Truncated Percentage Student Attendance (%SA) to Mean Student Outcome (MSO).

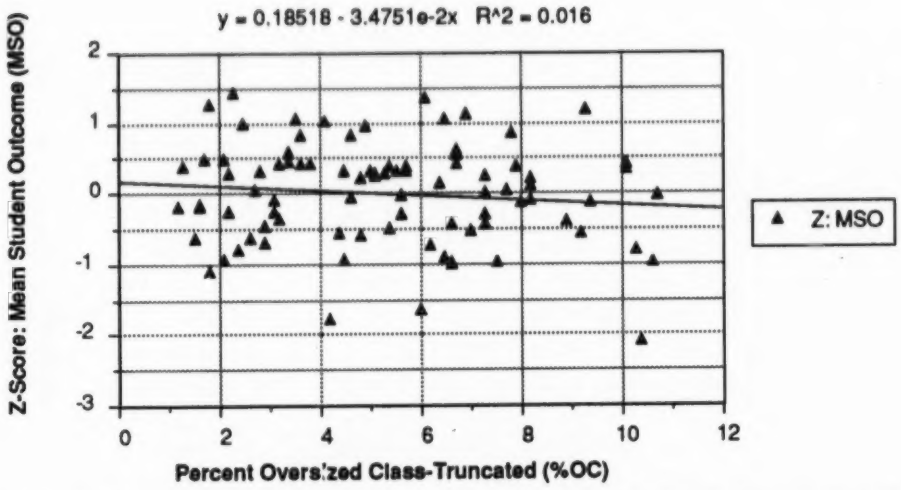

Figure 16. Relationship of Percent Oversized Class -Truncated (%OC) to Mean Student Outcome (MSO).

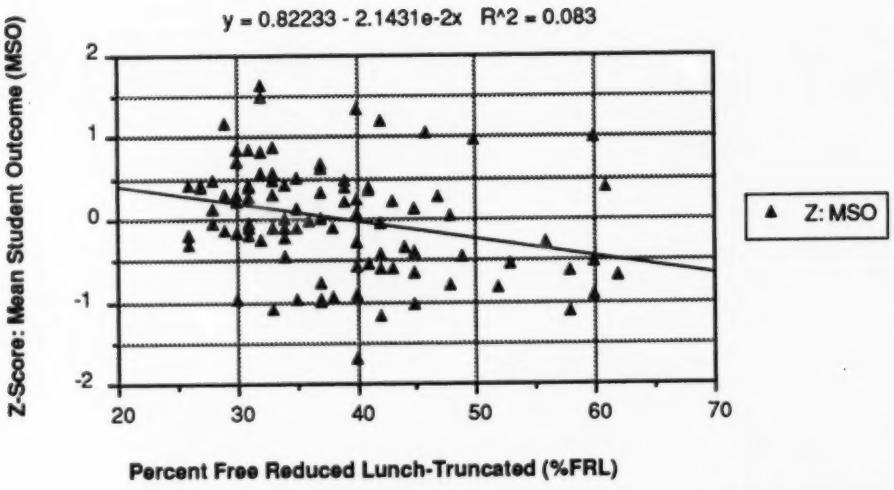

Figure 17. Relationship of Percent Free Reduced Lunch -Truncated (%FRL) to Mean Student Outcome (MSO).

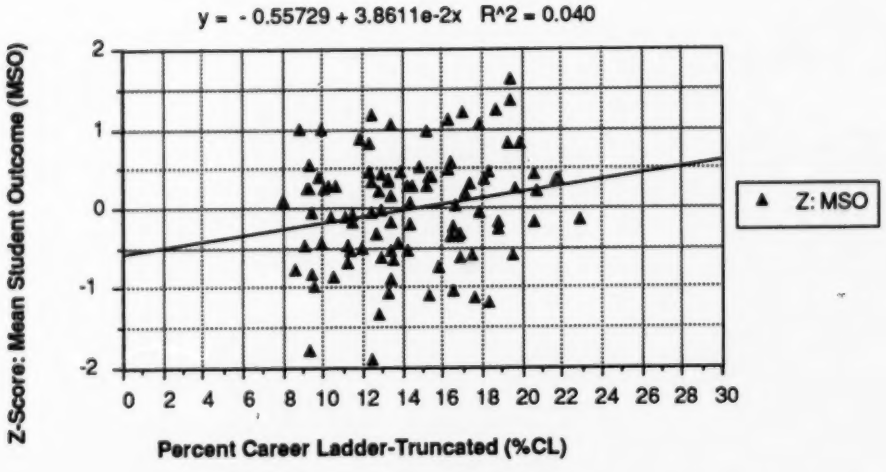
y = - 0.55729 + 3.8611e-2x R^2 = 0.040
Z-Score: Mean Student Outcome (MSO)
2
1
0
-1
-2
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Z: MSO
Percent Career Ladder-Truncated (%CL)

Figure 18. Relationship of Percent Career Ladder -Truncated (%CL) to Mean Student Outcome (MSO).

APPENDIX D
Polynomial Regression Analysis (n=121)

Figures 19 through 26: Relation of Independent variables to Mean Student Outcome (MSO).

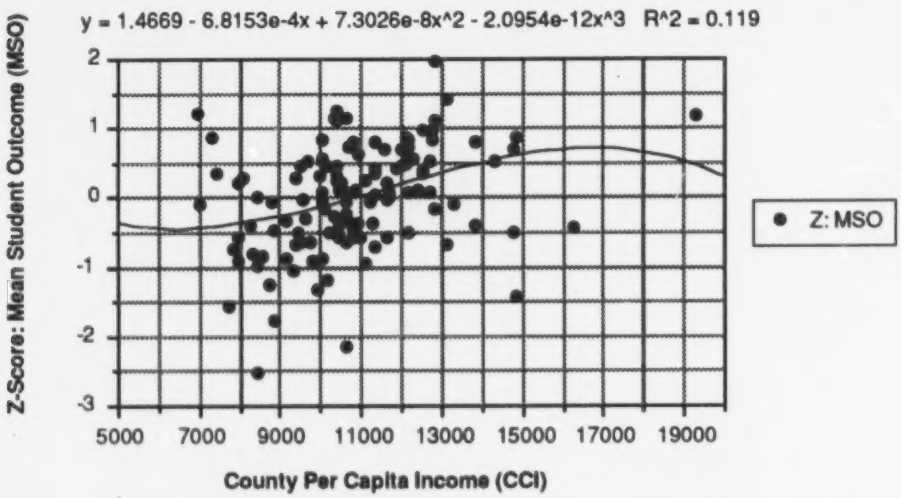

Figure 19. Percent County per Capital Income (CCI) to Mean Student Outcome (MSO).

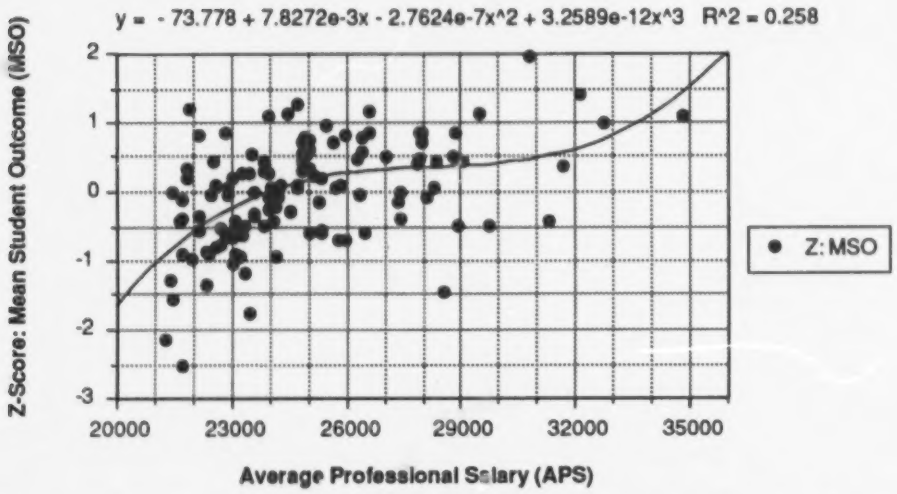

Figure 20. Percent Average Professional Salary (APS) to Mean Student Outcome (MSO).

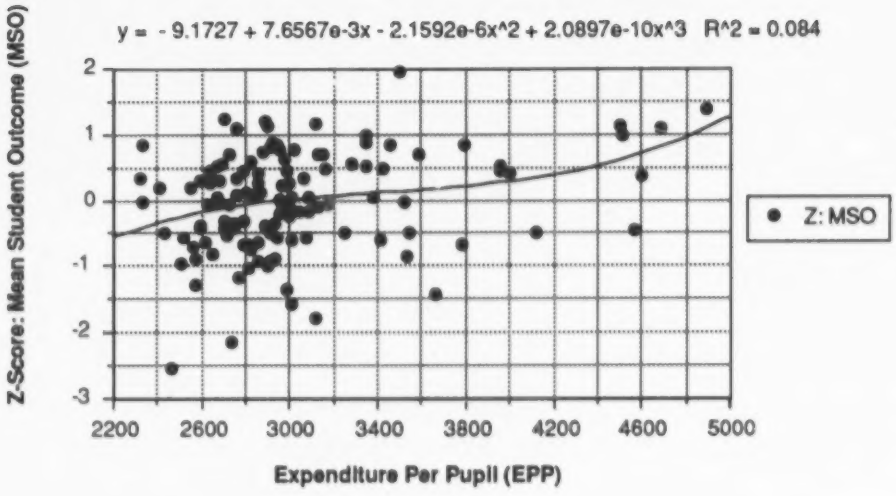

Figure 21. Expenditure Per Pupil (EPP) to Mean Student Outcome (MSO).

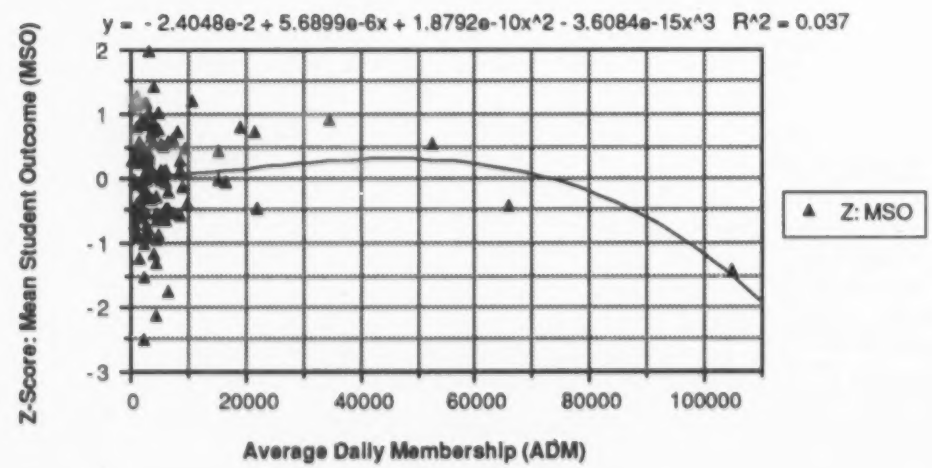

Figure 22. Average Daily Membership (ADM) to Mean Student Outcome (MSO).

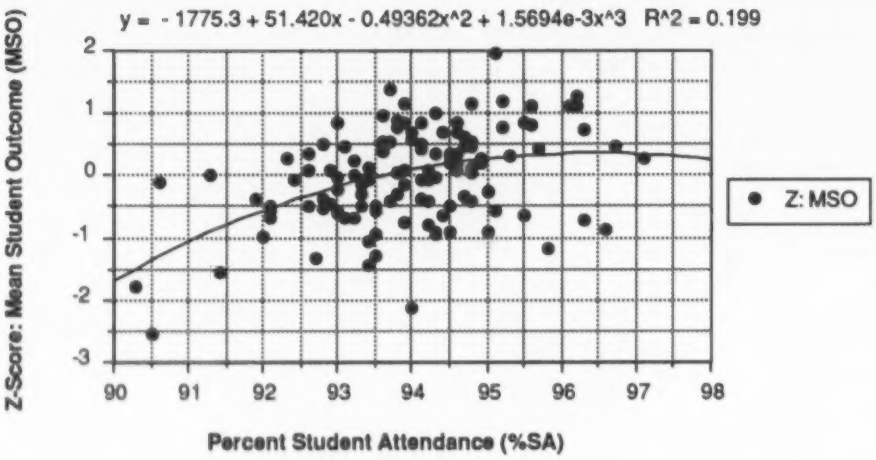

Figure 23. Percent Student Attendance (%SA) to Mean Student Outcome (MSO).

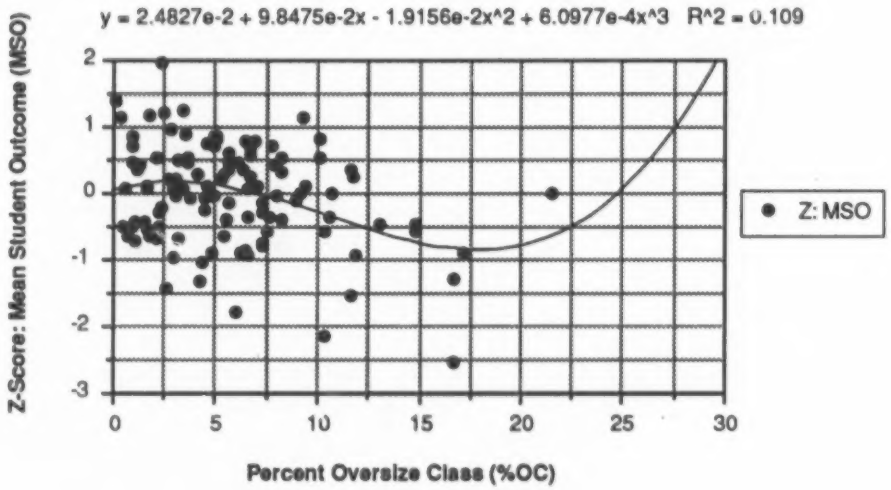

Figure 24. Percent Oversized Class (%OC) to Mean Student Outcome (MSO).

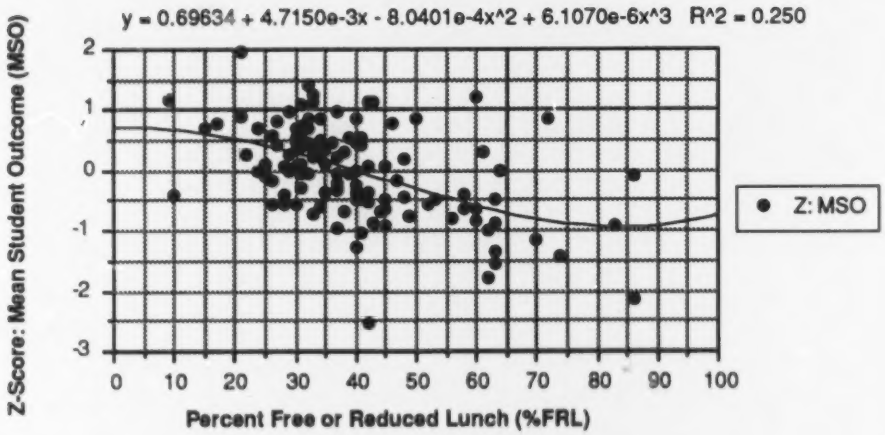

Figure 25. Relationship of Percent Free or Reduced Lunch (%FRL) to Mean Student Outcome (MSO).

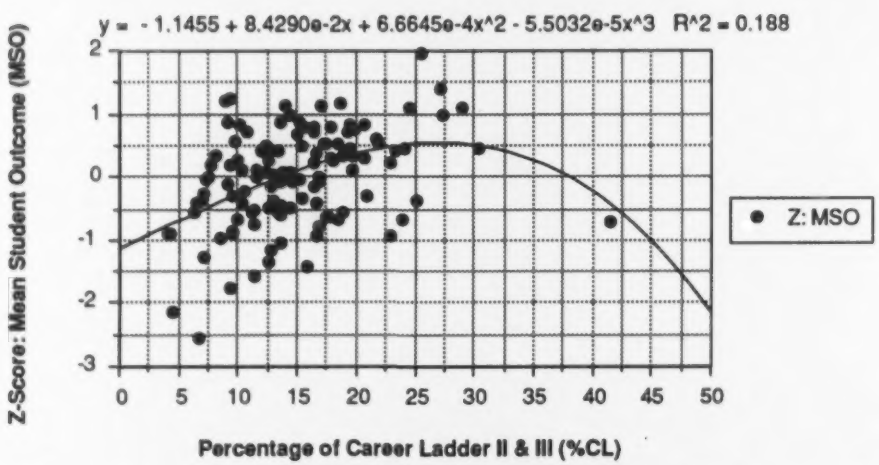
y = - 1.1455 + 8.4290e-2x + 6.6645e-4x^2 - 5.5032e-5x^3 R^2 = 0.188
Z-Score: Mean Student Outcome (MSO)
2
1
0
-1
-2
-3
0 5 10 15 20 25 30 35 40 45 50
Percentage of Career Ladder II & III (%CL)
Z: MSO

Figure 26. Relationship of Percentage of Career Ladder II & III (%CL) to Mean Student Outcome (MSO).